Rothwell (P. D.)

OXYGEN

—AS A—

THERAPEUTIC AGENT.

ITS GERMICIDAL AND HEALING QUALITIES; ITS CONSEQUENT ADAPTABILITY TO THE TREATMENT OF CONSUMPTION AND PULMONARY AND THROAT TROUBLES GENERALLY; ITS PLACE IN SURGERY. WITH A REPORT OF TWENTY CASES TREATED IN THE PRACTICE OF DRS. ROTHWELL.

BY P. D. ROTHWELL, M. D., DENVER, COLORADO.

[*Reprint from "Denver Medical Times."*]

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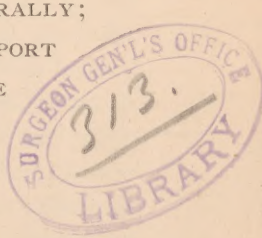

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OXYGEN AS A THERAPEUTIC AGENT.*

ITS GERMICIDAL AND HEALING QUALITIES; ITS CONSEQUENT ADAPTABILITY TO THE TREATMENT OF CONSUMPTION AND PULMONARY AND THROAT AND NOSE TROUBLES GENERALLY; ITS PLACE IN SURGERY. WITH A REPORT OF CASES TREATED IN THE PRACTICE OF DRS. ROTHWELL.

By P. D. Rothwell, M. D., Denver, Colo.

Mr. President and Gentlemen of the A. C. M. S.;—

It is my privilege to introduce to your notice to-night an agent whose very name may cause a smile of derision to pass over the features. That in its struggle to gain a footing in materia medica, oxygen has sometimes been in bad company must be frankly admitted. That it has been termed *compound*, when the merest tyro in chemistry knows that it is an element and hence must be *simple*, is true. That it has been advertised and doubtful mixtures supposed to contain it shipped all over the country, cannot be denied. But, notwithstanding these facts, I claim your indulgence for a few moments, while endeavoring to prove that oxygen should have a place, a most important place, in the materia medica. We do not fail to respect the truths of the science of chemistry because at one time when termed alchemy, the investigators were often deficient in their theoretical views, and pursued in their experiments delusive ends, such as the discovery of the philosopher's stone, which being mixed with the baser metals, was to transmute them into gold. (The quack advertisers of compound oxygen may have had dreams of the precious metal also). We consult our watches to give us important information in reference to the sinking pulse, or the hurried respiration; the watch divides the passing time according to astronomical principles, and did not astronomy have its beginnings in the doubtful company of the pseudo-science, astrol-

*Read before the Arapahoe County Medical Society.

ogy? We respect the truths of chemistry and astronomy, although in the evolution of these sciences they may at times have kept the company of wizards, diviners and soothsayers. Oxygen as a therapeutic agent has been associated with charlatans; let us lift it to its true place. The day is not far distant when there will be no more temptation to advertise O than iron; its value will be fully conceded by the profession.

Oxygen composes one-fifth of the earth's atmosphere, one-half of the earth's crust and eight-ninths of all the water of the globe. It is the third most important constituent of the meteors that flash across the heavens, and if they are stray visitors, as some suppose, from the worlds beyond, we may form an idea of the place O occupies there. This element is the immediate supporter of animal life; Tanner lived forty days without food; he could not live five minutes without oxygen. For it we utter our first cry, and sadly in need of it the last dying groan will be uttered.

With each of the remaining sixty-three elements, it combines, with the exception of fluorine, and with this, union will take place through the mediation of copper. Locked in the embrace of all nature, its presence is necessary for the higher forms of life—its absence is disintegration and death. Union with other elements is termed oxidation—not necessarily a destructive process—the rust forming on the outside of the iron (oxide of iron) seeming to protect the main portion from harm. Pasteur has shown that the oxidizing power of atmospheric oxygen is exaggerated; that the decay of animal and vegetable substances exposed to air is due to the action of microscopic organisms. It may be safe to say that O does not at all aid the process of decay.

By the action of light, the leaves of green plants liberate O from its union with water (H_2O); the plant breathes out O and breathes in carbon; we breathe in O and breathe out carbon; a beautiful system of interdependence that should not be lost sight of in the treatment of phthysis, as will be shown farther on. Put the plant in an atmosphere of O and it will fare as badly as we would in an atmosphere of carbon dioxide. With proper surroundings, the plant quietly assimilates what it needs, storing up

a mighty force, as may be tested by harnessing a growing pumpkin. By sending the tender rootlets downward, see how it shatters and disintegrates the massive rocks.

Oxygen was discovered in England by Priestly, in 1774. He called it dephlogisticated air (prefix *de*, from; *phlogistos*, burned), that is to say, air from which the supposed inflammable principle was removed. Scheele named it empyreal air; Lavvosier in 1778, named the element oxygen (*oxys*, acid, *gennao*, to generate), because he supposed it to be present in all acids.

Oxygen is a colorless, tasteless, odorless gas, can be condensed to a liquid at —1400°C, with a pressure of 500 atmospheres. A gallon weighs seventy-nine grains, twelve cubic feet weigh one pound, thirty-seven parts soluble in 1000 parts of water, and this property is of great interest to plants, and still more to water animals, the greater number of which are dependent on this dissolved oxygen for the support of respiration and life. An adult consumes over 46,000 cubic inches (over two pounds) in twenty-four hours, amounting in a year to 837 pounds.

Great things were expected of this agent at first, but its popularity was destined to be of short duration—the manner of its preparation being at fault. It was obtained from the red oxide of mercury, and owing to deficient washing of the gas, several severe cases of salivation followed its inhalation. Mercury, valuable agent as it is in the treatment of diseases, was almost driven from the materia medica, also. But there are many other sources from which we can obtain O, and by a little care free it from all impurities—for instance: we can obtain it from manganese dioxide (MnO_2) heated; from bichromate of potash ($K_2Cr_2O_7$) + sulphuric acid (H_2SO_4); from nitrate of potash (KNO_3), dioxide of barium (BaO_2) and sulphuric acid; from water by electrolysis, etc., etc. The most convenient method and at the same time the cheapest, is from heating chlorate of potash ($KClO_3$) to which manganese dioxide has been added to act as a good conductor of heat. Expressed in chemical language we have the following:

$$2KClO_3 + \text{heat} = KClO_4 + KCl + O_2,$$

then $KClO_4 = KCl + 2O_2$, O_2 being the common form of O. As

the manganese dioxide undergoes no marked change, it is not necessary for it to appear in the formula. During the generation of the gas, on its way to the gasometer, it should pass through several wash bottles containing strong solutions of caustic potash, so that any free chlorine that might otherwise pass over, may be taken up by the potash and remain in the wash bottles. The chlorate of potash and manganese should be mixed in the proportion of four to one. In this connection it will be well to mention an agent that is used in connection with the oxygen.

Nitrous Monoxide (N_2O).

This gas was discovered by Priestly in 1766, and is prepared by decomposing ammonium nitrate by heat:—

$$NO_3(NH_4) + \text{Heat} = N_2O + 2H_2O.$$

N_2O is a colorless, odorless gas, having a sweetish taste; under a pressure of thirty atmospheres at 0° it forms a colorless, mobile liquid. Next after O it is the best supporter of combustion known; though capable of maintaining respiration longer than any gas or mixture of gases except O or air, yet an animal will live but a short time in an atmosphere of pure nitrous oxide.

A few inhalations produce a feeling of comfort and quiet; continuing the inhalations, various phenomena are manifested, ending up with complete anæsthesia. If the gas is pure, no bad effects remain. I have taken sixty gallons on several different occasions, and when the effect passed off—in a few minutes—feelings were normal.

After these introductory remarks designed to make you acquainted with the two agents to be used further on, let us pause a few moments and take a view of the field of medicine and learn lessons from the trend of its teachings. Let us compare the medicine of to-day with that of the past. Let us do this, not in a spirit of self-gratulation, but rather with respect for the past, an unsatisfied feeling for the present, and gleams of hope for the future. This is an age of progress. The hand that moves round the clock face moves in the mind. The Utopia of to-day may become flesh and blood to-morrow. The citadels built on all sides against the human race by superstitious dog-

matism and prejudice, may slightly terrify us, but science will turn the position.

There was a time when the victim suffering from the effects of cataract was given medicine by the stomach, in the vain hope that some of that medicine would enter the blood, make its way to the lense of the eye, and in some mysterious manner clear away the dark curtain that has shut out the light. What would we think of such a course to-day? The eye, one of the most delicate organs, is itself treated. The surgeon cuts down and removes the clouded lense and admits the light. What gallons of medicine have been swallowed to remove ovarian tumors! Who would think of giving medicine by the stomach to remove a seventy or one hundred pound tumor to-day? The skillful surgeon opens the abdominal cavity, cuts out the tumor, ligatures the stump, sews up the wound he made, the stomach has *food* and the patient lives. In persistent cases of ovaritis, the stomach again was made the vehicle for the all-potent medicine that was to relieve the fearful agony. It may have done so for a time, but how often was it done at the fearful expense of forming a habit whose frightful consequences no words can picture—the morphine habit. Blisters over the seat of pain may have been getting nearer the truth. To-day the surgeon cuts down and removes the offending member, literally construing, "If thy right eye offend thee, pluck it out." In the treatment of skin diseases, the skin itself is paid some attention, and the poor, weary stomach is rested from constitutional deluges three or more times a day. The sufferer from sciatica finds relief when the nerve is cut down to, pinched and stretched; sleepless nights from supra orbital neuralgia are turned into hours of healthful repose by a section of the supra-orbital nerve; and not a drop of medicine is taken by the stomach in either case. In gunshot or stab wounds of the abdomen, the expectant method of treatment was the rule—*i. e.*, the *wait and see* method—as a result a large percentage of deaths. *Cut and see* is the method to-day—as a result a large percentage of recoveries. The friends of the victim likely to suffer from hydrophobia formerly hunted the country for the famous madstone. That is the way the scene opened. It generally closed with a tableau in which two

feather beds played a prominent part. At the present time the friends send the unfortunate to Pasteur, and his chances for recovery are good. Cutting open the stomach for the purpose of removing a foreign body has been successfully performed, and the patient has recovered. Certain nervous derangements point definitely to pressure on some part of the brain; the part in trouble can be located definitely; a tumor may be the cause. Does the surgeon treat through the medium of the stomach? Not now. Experience has shown that parts of the brain can be cut if necessary; he removes the tumor, *that* removes the pressure and soon the nervous derangements subside. The tendency of medicine to-day is to get at the cause—to treat the trouble in its home. Is it necessary to multiply instances? You could suggest dozens more. The point made should stand out in bold relief—the stomach must no longer be the open sesame into which unkind, unthinking, unscientific men are allowed to pour all kinds of compounds for the cure of all kinds of diseases. Physicians are beginning to study nearer to nature's heart. Just in proportion as they study so, will the thousand and one *symptom* remedies fall into disuse and the few useful agents that experience has shown to be capable of getting at causes and removing or modifying *them* will stand out prominently. The nihilism of fancy and fanciful remedies must and will become popular.

Let us now look at the manner in which diseased conditions of the lungs, comprehended under the term consumption, have been treated in the past, and see the gradual change that has been working its way into lung therapy up to the present. It is not my purpose to go very far back. How will it suit you to take a few extracts from an article entitled "An Inquiry into the Causes and Cure of the Pulmonary Consumption," by Benjamin Rush, M. D., published in Philadelphia, in 1797. Here is what he says:—"I shall begin by remarking,

"I. That the pulmonary consumption is induced by predisposing debility.

"This, I infer, First, from the remote and exciting causes which produce it. The remote causes are pneumony, catarrh, hæmoptysis, rheumatism, gout, nervous and intermitting fevers, measles, scrophula, asthma, repelled humors from the surface of

the body, the venereal disease, obstructed menses, sudden growth about the age of puberty, grief, and all other debilitating passions of the mind: hypochondriasis, improper lactation, excessive evacuation of all kinds, more especially by the stool, cold and damp air, external violence acting upon the body; and finally everything that tends directly or indirectly to impair the vigor of the system.

"The most frequent exciting cause of consumption is the alternate application of heat and cold to the whole external surface of the body, but all the remote causes which have been enumerated, operate as exciting causes of consumption when they act on previous debility. Original injuries of the lungs seldom induce this disorder except they first induce a debility of the whole system by a troublesome and obstinate cough.

"Second, from the occupation and habits of persons who are more liable to this disorder. These are studious men, and mechanics who lead sedentary lives in confined places: also women and all persons of irritable habits, whether of body or mind.

"Third, from the period in which persons are most liable to be affected by this disorder. This is generally between the eighteenth and thirty-sixth years of life, a period in which the system is liable in a peculiar manner to most diseases which induce the disorder, and in which indirect debility is oftener produced than in any other stage of life, by the excessive exercises of the body and mind in the pursuits of business or pleasure.

"II. The pulmonary consumption is a primary disease of the *whole* system. This I infer,

"First, from the causes which produce it, acting upon the whole system.

"Second, from the symptoms of general debility which always precede the affection of the lungs. These symptoms are a quick pulse, especially towards evening; a heat and burning in the palms of the hands, faintness, head-ache, sickness at stomach, and an occasional diarrhœa. I have frequently observed each of these symptoms for several months before I have heard of a single complaint in the breast.

"Third, from the pulmonary consumption alternating with

other diseases, which obviously belong to the whole system. I shall briefly mention these diseases.

"The Rheumatism.—I have seen many cases in which this disease and the consumption have alternately, in different seasons or years, affected the system. In the winter of 1792, three clinical patients in the Pennsylvania hospital exemplified by their complaints the truth of this observation. They were relieved several times of a cough by pains in their limbs, and as often, the pains in their limbs seemed for awhile to promise a cure to their pulmonic complaints. * * * *" Dr. Rush here mentions the gout, madness, headache and dyspepsia, pains in ear, eruptions on the skin, etc., and then proceeds:

"Fourth. I infer that the pulmonary consumption is a disease of the whole system from its analogy with several other diseases which, though accompanied by local affections, are obviously produced by a morbid state of the of the whole system. * * * *

"Fifth. I infer that the pulmonary consumption is a disease of the whole system, from its existence without ulcers in the lungs. Of this there are many cases recorded in books of medicine.

"Sixth. And lastly, I infer, that the pulmonary consumption is a disease of the whole system from its being relieved or cured only by remedies which act upon the whole system. This will appear, I hope, hereafter, when we come to treat of the cure of this disorder. * * * *

"I yield to the popular mode of expression when I speak of a consumption being produced by tubercles. But I maintain that they are the *effects* of general debility communicated to the bronchial vessels which cause them to effuse a preternatural quantity of mucus. * * * * Physicians, the most distinguished for accurate observations, have agreed that the pulmonary consumption may be communicated by contagion. * *"

Dr. Rush concludes this portion of his article as follows: "If the reasonings founded upon the facts which have been mentioned be just, then it follows:

"*That the cough, tubercles, ulcers and purulent or bloody discharges which occur in pulmonary consumption, are the* EFFECTS

and not the CAUSES *of the disease: and, that all attempts to cure it, by inquiring after tubercles and ulcers, or into the quality of the discharges from the lungs are as fruitless as an attempt would be to discover the causes or cure of dropsies, by an examination of the qualities of collections of water, or to find out the causes and cure of fevers by the quantity or quality of the discharges which take place in those diseases from the kidneys and skin.*"

TREATMENT. (DR. RUSH.)

I.—"*Blood-letting.*—It may seem strange to recommend this debilitating remedy in a disease brought on by debility. Were it proper in this place, I could prove that there is no disease in which bleeding is prescribed, which is not induced by predisposing debility in common with pulmonary consumption. I shall only remark here, that in consequence of the exciting cause acting on the system, (rendered extremely excitable by debility) such a morbid and excessive excitement is produced in the arteries as to render a diminution of the stimulus of the blood absolutely necessary to reduce it. I have used this remedy with great success in every case of consumption, attended by a hard pulse, or a pulse rendered weak by a laborious transmission of the blood through the lungs. In the months of February and March, in the year 1781, I bled a Methodist minister, who was affected by this state of consumption, fifteen times in the course of six weeks. The quantity of blood drawn at each bleeding was never less than eight ounces, and it was at all times covered with an inflammatory crust. By the addition of country air, and moderate exercise, to this copious evacuation, in the ensuing spring he recovered his health so perfectly as to discharge all the duties of his profession for many years, nor was he ever afflicted afterwards with a disorder in his breast. I have in another instance, bled a citizen of Philadelphia eight times in two weeks, in this state of consumption, (inflammatory), and with the happiest effect."

Dr. Rush relates several other instances in which blood-letting had a good effect and deplores the fact that prejudice against such a valuable remedy caused the death of many that might otherwise have been saved.

Next after blood-letting, Dr. Rush recommends *milk* and *vegetable diet:* if the patient objects to bleeding, "vomits" should be used; *nitre* in moderate doses of ten or fifteen grains three or four times a day: *cold* and *dry* air, combined with the exercise of *walking*. In the "hectic state of consumption." if bleeding did no good or was not indicated, there was no good accomplished by "alternately using the most gentle and the most powerful vegetable and metallic tonics." In the typhus-state (as he calls the third stage), he places *stimulating medicines* first, after this he mentions balsam of Peru, oil of amber, turpentine, tar, garlic, elixir vitrol, horehound tea, decoction of inner bark of wild cherry, cold bath.

In the palliative remedies he gives the first place to "a dry situation," then "country air, loose dresses and a careful accommodation of them to the changes in the weather: artificial evacuations by means of blisters and issues, certain fumigations and vapors, (sulphurous, saline, pine, etc.); lozenges, syrups and demulcent teas; opiates; different positions of the body; sleeping between blankets in winter: moderate use of the lungs in reading, public speaking, laughing and singing; excitement of certain passions (hope, fear)."

Under the head of *radical remedies*, exercise stands first—"rocking in a cradle, swinging, sailing, riding in a carriage, riding on horseback, walking, running, dancing, etc." "Avoid fatigue. Avoid traveling too far in the morning, and after the going down of the sun in the evening." "Avoid lying down in the day with the clothes on; damp sheets, evening parties, extremes of heat and cold." In concluding his article, the author says that he inherited a predisposition to the pulmonary consumption and that between his eighteenth and forty-third years, had many of the symptoms, but that he has "enjoyed for several years nearly an uninterrupted exemption from pulmonary complaints," by the use of the methods and remedies just described.

Dr. Benjamin Rush occupies a most prominent place in the history of Medicine in America. I thought it advisable to give a good many of his ideas in detail, because seeing what methods of treating pulmonary troubles were in vogue in the latter part of the eighteenth century, we can, by contrast, more easily see the status in the now rapidly waning nineteenth century.

Dr. Cullen recommended bleeding in consumption in order to lessen the inflammation of the ulcers in the lungs, and thereby dispose them to heal. He regarded consumption as a *local* disease. Dr. Sydenham believed strongly in the efficacy of *riding on horseback*, in the cure of consumption. Dr. Fuller, speaking of the consumptive, says: "He must, like a Tartar, learn to live on horseback, by which means he will acquire in time, the constitution of a Tartar." In a book entitled "Primitive Physic: or, an early and Natural Method of Curing all Diseases," by Rev. John Wesley, M. A., printed in 1747, you can find the following:—"*For a consumptive*, eat cow-heel soup, and every morning cut up a turf of fresh earth, and, lying down, breathe into the hole for a quarter of an hour. I (Wesley) have known a deep consumption cured thus. But Mr. Masters was so far gone in consumption that he could not stand alone. I advised him to lose six ounces of blood every day for a fortnight, if he lived so long, and then every second day, and third day, and fourth day, and fifth day, for a fortnight each. In three months he was well. In the last stages suck an healthy woman; this cured my father."

Let us pass from Rev. Wesley, in 1747, to "Dr. Geo. B. Wood's Practice of Medicine," published in 1847, and note some of his suggestions. He puts exercise in the open air first, proper regulation of temperature of the body second, regulation of diet and proper mental influence third, medicine last. Believes a decoction of wild cherry bark useful, also pipsissewa, inhalations of tar water vapor, bitters, such as columbo, gentian and tincture of chloride of iron and iodide of potash. He notices some of the plans then in use, such as emetics in the early stages, daily, or every other day; residence in a miasmatic district on the grounds that the disease is much less frequent in such districts of the same temperature, and that the occurrence of miasmatic fever sometimes supersedes phthisis.

The latter plan must have been on the principle of the physician that cured his patients by throwing them into fits—you know the rest. Or was it the dawn of bacterio-therapy to be noted farther on?

It was noticed that tanners were said to be free from the disease—thought this was owing to exhalations from the oak

bark—hence put oak bark in sleeping apartments. Patients were also made to breathe the air of stables in which cows were kept, because the breath of these animals was supposed to exercise a good effect on the disease. Digitalis and hydrocyanic acid, he mentions as having been at one time considered specifics, but that they were no longer considered so. Compression of the chest and operation of paracentesis recommended to induce collapse of diseased lungs.

Sir Thomas Watson believed in food, exercise and cod-liver oil. Spoke favorably of a dry, cold climate. He did not believe that consumption was contagious on the ground that a diathesis is not communicable from one person to another.

Dr. Churchill introduced the hypophosphites as a specific, the pathology of the disease being supposed to indicate deficiency of phosphates.

Dr. Morrel Wyman introduced fusil oil as a symptom remedy. Arsenic in minute doses and increasing, was extolled in strong terms by the French writers. Dr. Theodore R. Varick, of Jersey City, lauded a solution of caoutchouc in spirits of turpentine, prepared as a confection.

Dr. Austin Flint, in an edition of his practice of medicine in 1873, says:—

"The point of departure for the consideration of this affection is the pathological fact that the local affection is the expression of a general constitutional morbid condition—the latter being the essential disease. *The great object of treatment*, therefore, is the removal of this constitutional morbid condition or the tuberculous cachexia. Measures addressed to the pulmonary affection are of secondary importance." Do you not, in this statement, gentlemen, recognize the teachings of Benjamin Rush? Dr. Flint plainly states that the condition of the lungs is of secondary importance.

Speaking of climate Dr. Flint says: "The feelings and choice of the patient are to have considerable weight. If, when in health, more vigor and enjoyment are habitually experienced in summer than in winter, a warm climate will probably be best, and if the reverse be true, a cold climate is to be preferred." He recommended traveling, but believed that the number not bene-

fitted exceeded the number benefitted —owing to the fact that many persons that traveled were not properly prepared. However much we may differ from Dr. Flint on other statements, here is one that we can fully endorse and recommend to the earnest consideration of eastern physicians: "It is truly a cruel act to send to a distance, patients who are in a condition admitting of but little improvement and who will not probably live to return."

After giving you a glance at the methods of such men as Cullen, Rush, Sydenham, Fuller, Watson, Wood, Flint, it will hardly be necessary to dwell at length on the period in the treatment of consumption in which it seemed to pass out of our hands and into the domain of the manufacturer of the various emulsions of cod liver oil, oleo-chyle, extracts of malt, hypophosphites, cherry pectorals, and the thousand and one other preparations lauded as almost specifics. They were all intended to fortify the system against the encroachments of the disease. They were symptom remedies. In the future they will rank as foods, (some of them), and not palatable at that. Remember that the stomach was the vehicle used for treating the lungs. The lungs were considered of *secondary* importance—the very portion of the system most severly affected was considered *secondary*. How strange all this will look in the near future. Does it not seem strange to us now to read that at one time *roasted toad* was used as a specific for gout? Here is the receipt: "Put the toads alive into an earthen pot, and dry them in an oven moderately heated, till they become fit to be powdered." Boyle recommended the thigh bone of an executed criminal as a valuable remedy for dysentery. Other such remedies were the bowels of a mole cut open alive, and mummy made of the lungs of a man who had died a violent death.

In looking over the current medical literature of the last few years you will see an idea working its way to the front. There is not so much talk about diathesis, cachexia, heredity—the *lungs themselves* begin to attract attention and their condition is considered of primary importance and not secondary, as heretofore.

How often have physicians misapprehended nature and made

their misapprehensions principles or entities in nature. In this manner have come explanations that were not explanations at all:—a vital principle to preside over the phenomena of life; a spiritual principle to account for mental processes; a principle of phlogiston to explain the phenomena of combustion; a soporific principle to account for the narcotic properties of opium. Before the discovery of the circulation of the blood laid the foundation to a true physiology, there were almost as many special animal principles or spirits invoked as there were special functions of the body—a concoctive spirit to do the first work of digestion, a chylopoietic spirit to carry the work further, and other spirits to perform other functions. Harvey had to protest earnestly in his day against the "common subterfuge of ignorance" by which spirits were called into play whenever the knowledge of true causes failed. The "principles" of diathesis, the "spirit" of cachexia, the "symptom" treatment—are not the knowledge of the true causes nor the proper treatment of consumption. *Consumption, a local disease and demanding local treatment*, is the idea that is gaining ground to-day. There have been traces of this truth for centuries. Though not fully recognized, yet all the physicians that recommended exercise, fresh air and change of climate were really proclaiming the doctrine.

"Nothing that is shall perish utterly,
But perish only to revive again
In other forms, as clouds restore in rain
The exhalations of the land and sea.
Men build their houses from the masonry
Of ruined tombs; the passion and the pain
Of hearts that long have ceased to beat, remain
To throb in hearts that are, or are to be."

Traces of the "is" in a therapeutical form have been mentioned—breathing the vapor of tar water, breathing the exhalations from cow stables, breathing air modified by oak bark, and Wesley's inhaler—a hole in the ground. Vague traces, you will say, but the germs of truth were in them—exercise of the lungs and the medicaments applied directly to them.

It is not necessary to dwell upon that period in the treatment of consumption in which moist inhalations from tar water

and various balsams were used. A great deal of good was expected of this method, but it was not satisfactory for reasons that will become manifest further on.

There was a period in the history of our race when the great worlds beyond us were considered to have an important influence upon the temperament and health of the people—the worlds better revealed and studied by the telescope. But we no longer fall down trembling at the presence of a comet, a shooting star, or an eclipse. The unseen world revealed by the microscope, so densely populated with organisms that numbers cannot represent them, or if they could, the mind would utterly fail to grasp their significance—in this region in which we live and move and have our being—science is directing us to look for the causes of disease. The microbe is abroad in the land and the first fruits is a microbic revolution in surgery. The pernicious effects of air upon accident and operation wounds have been fully recognized for three centuries—in the sixteenth century by Ambrose Pare, Wurtz and Fallopius; by Wiseman in the seventeenth century; by Bœrhave, Belloste, Parmanus, Hugh Munro, James Latta, and most completely of all by Abernethy, in the eighteenth century. (It is proper to state that these views were opposed by John Hunter and John Bell.) The germs floating in the air come in contact with wounds and make them unhealthy, is what we begin to know in the latter part of the nineteenth century. Pus is demonstrated to be a product of their activity—there cannot be pus without them—it is a culture fluid in which microbes hold high carnival—as a result of these facts the "principle" or "spirit" of laudable pus is forever banished from the domain of surgery. There is no such thing as healthy pus—a manifest absurdity. The first surgeon that ever used the expression must have been put to his wit's end by some inquisitive patient and was not honest enough to simply say, "I don't know."

There is no need to enter into a defense of what is generally included under the term Lysterism. The profession and the world believe in the principle—cleanliness—though there may be some differences in the way in which the details are carried out. Some will continue to argue against the germ theory

in surgery, and cite cases where wounds healed successfully that had no care. As well might they argue that small-pox or scarlet fever are not contagious because very many persons have been exposed to them without any bad effect. No amount of witticism will explain away or alter the *role* of these organisms. An appeal to the all-wise and ever merciful Maker in such a relation is the merest bathos and unworthy a scientific discussion. Just as sensible to argue the non-existence of cataract, glaucoma, or yellow fever, because they are not consonant with somebody's concepton of the all-wise and merciful Maker. A few pages back some of the wonderful achievements of modern surgery were related these grand achievements have been made by those who recognize and believe in the germ theory of disease. Surgery to-day is almost an exact science. A limb can be amputated with proper antiseptic precautions, and in a week or so, as the case may be, the first dressing is removed to find a perfect result. As one of the board of pension examiners, a good many wounds made in the late war come under my observation. How many of them were made worse by gangrene. Taken altogether, the surgery in that war was of a high order, and yet statistics will show that it will not compare with the surgery in the late Servo-Bulgarian outbreak. What gave the Bulgarians the better success? Antiseptic surgery: certainly their surroundings were not better.

Read Dr. Joseph Kucher's work entitled "Puerperal Convalesence and the Diseases of the Puerperal Period," and the most skeptical will be convinced of what antiseptics have done in midwifery.

The germ theory, as an explanation of the origin of many forms of disease, has, at the present time, the preponderance of evidence in its favor.

Big fleas have little fleas
Upon their backs to bite 'em,
And these again have lesser fleas,
And so ad infinitum.

You will hear of ptomaines and leucomaines, alkaloids developed as the result of vital processes, as the cause of disease —thus making the cause autogenous. The fact that, for in-

tance, from the juices of the spleen a certain alkaloid isomeric with hydrocyanic acid can be obtained through a series of chemical reactions. does not prove to me that said alkaloids will be produced by the ordinary life processes. Atropia can be obtained from the deadly nightshade by a series of chemical reactions: is the thought tenable that the vital processes of the plant would under any circumstances elaborate this essence so as to destroy the plant? The poison in the fang of a rattlesnake is a ptomaine stored in a proper receptacle: might not urea eliminated from the blood by the kidneys, be regarded as of like character? We live by dying is true: is it true that life produces that which destroys itself? Or is this the truth— something outside ourselves comes to make the starting point for the perverted life process? Some claim that the ptomaines are the product of microbic activity. These questions are under discussion, and they are simply introduced here as suggestive of thought.

Microbes.

For two centuries histologists have been transferring these minute beings from the vegetable to the animal kingdom and back again. Thanks to the labors of Pasteur, Cohn, Koch, Sternberg, Nageli, Lister, Crookshank and other patient workers with the microscope, their true place has been found—the vegetable kingdom— ranking among the lowest forms of fungi. The bearing of this important fact will become apparent in the application of O to lung treatment—to be shown under that heading.

Accepting the microbe as the cause of all zymotic diseases, with many others, we are forced to acknowledge that for once in the history of medicine, etiology is advancing more rapidly than therapeutics. Every day or so you hear of the microbe of this or that disease having been found. But with the cause of the disease known as tubercle bacilli, comma bacilli, etc., as the case may be, comes the question, what shall we use to remove or destroy the offender? Here we are confronted with a difficulty; as a rule, any remedy powerful enough to kill the parasite, that is, to be a germicide, in its habitat, will make it uncomfortable for the host of the parasite. Therapeutists are in the

position of the landlord who has very bad tenants. They do not wish to vacate his premises: he concludes that he will drive them out with fire, but in the course of eviction his houses are destroyed. For cases of consumption in which the tubercle bacillus is a prominent actor we want something that will not injure our patient, but destroy the parasite. What shall it be?

Permit me to leave the field of general medicine and surgery and direct attention to the lungs. Lung tissue for centuries has been outside the pale of local interference, surgical or otherwise. More than two hundred years ago, a physician whose name has slipped my memory, proposed healing abcesses in the lungs by draining them from the outside, but, as a rule, such suggestions did not commend themselves to the profession. The present brilliant period of surgery that sees the abdomen opened, resection of the intestines, gastrotomy, portions of the brain removed, is not likely to pause before a diseased lung, and fall to tinkering with symptoms instead of getting at the cause. Are not the times now ripe for pneumotomies and pneumotomists?

Koch's discovery of the tubercle bacilli did much to direct attention to the lung itself. Soon after his theory became known, the treatment of consumption was divided as follows: 1.—The use of remedies to kill the bacilli. 2.—The use of remedies to fortify the system against the bacilli. One said, we will get rid of the cause—the other said, we will build so fast that this microbe cannot destroy our additions.

The first of these is the one to command our attention—getting at the cause, and there is no reason why the second may not be included. While attacking the enemy there is no reason why the breastworks should not be repaired. This brings us, gentlemen, to the consideration of local lung therapy and there will be instruction in making a short *resume* of the methods now in use.

One of the first plans of fighting the bacilli was the inhalations of vapors charged with an antiseptic or germicide. The theory was at least sensible, but the practice was not successful. Why? For the reason that anything strong enough to kill the bacilli was too strong to penetrate further than the bronchial

tubes. Then there is another reason. The profession concede the value of a dry climate, and as a consequence dry inhalations; why then this manifest contradiction between the requirements of the climate and the plan of treatment?

Pneumatic differentiation—breathing air under different degrees of atmospheric pressure, is a local method of treatment directed more to the development of the lungs than to the destruction of the bacilli. There is much to be said in favor of this plan of treatment, first suggested by the effects of compressed air on the workmen engaged in caissons used in sinking piers for bridges. Karl von Ruck, M. D., of Norwalk, Ohio, gives the result of three months' experience with the pneumatic cabinet and the cases treated, in the December *Physician and Surgeon*. Incipient catarrhal phthisis, tuberculosis, chronic pneumonic consolidation, chronic catarrhal phthisis, pulmonary emphysema and chronic bronchitis, are reported cured. Dr. Herbert F. Williams, in an article entitled "Antiseptic Treatment of Pulmonary Diseases by Means of Pneumatic Differentiation," reports sixty-two cases treated, thirty-four recoveries, ten improvements, seven non-improvements, and eleven deaths.

Dr. Bergeon, of Lyons, has been experimenting on the action of gaseous enemata for some time, and finds them useful in a variety of diseases depending on the presence of micro-organisms. The gas used is sulphuretted hydrogen. Its introduction into the lungs through the respiratory passages is dangerous, but this gas can be absorbed by the rectum in an almost unlimited quantity, and eliminated by the lungs without harm. Nine cases of pulmonary phthisis reported treated with marked improvement. This system of treatment is not likely to become popular in general practice.

Intra-Pulmonary Injections.

Dr. Beverley Robinson, M. D., has this to say on the utility to patients suffering from pulmonary phthisis of intra-pulmonary injections: "Permit me to ask what is our ordinary experience of the treatment of pulmonary phthisis by usual methods? Is it not deplorable and disheartening to the highest degree? * * Does the continued taking of cod-liver oil and the hypophosphites really

cure them? Does painting with iodine or repeated blistering make perceptible changes for the better in the local lesions at the apices, that march so surely onward? I believe we must all say frankly, although regretfully, no! * * * Most happily, therefore, in my judgment, three plans of treatment have been presented to the medical profession during the past few years for pulmonary phthisis— super-alimentation, intra-pulmonary injections, continuous dry inhalations." Various antiseptic solutions are injected into the cavities in the lungs with good effect. But we come face to face with the trouble mentioned before—a solution strong enough to be a valuable antiseptic is not well borne by the lung tissue. Notwithstanding this drawback, Dr. John Blake White treated eleven cases by injections of carbolized iodine with marked success.

A physician in Lyons, France, treated forty cases of pneumonia by intra-pulmonary injections, and reports a success in each.

Bacterio-Therapy.

A French physician has seriously proposed to cure consumption by introducing into the system, bacterium termo, a micro-organism that is stated to be antagonistic to the bacillus tuberculosis, on the same principle that we bring in a cat to get rid of the mice. The thought that man, standing at the head of creation, must call to his aid a bacterium termo to help him in his struggle for existence, is humiliating. This plan of treatment is on trial. Who knows but Wesley's patient long ago breathed in some kind of a bacterium from the hole in the ground, that went to work for the new host and routed his former guests?

Another French physician is experimenting on inoculation against phthisis. He has found that tuberculosis developed artificially in the guinea pig can be stopped in its course by injections containing a very small quantity of carbolic acid.

What lesson is to be learned from the plans of local treatment just read? The advance of scientific investigation demanded the change from constitutional to local methods. The profession have too long stood with folded hands, thinking they had "done all that could be done," when that all consisted in try-

ing to strengthen the general system and let the lungs take care of themselves. No one contends that all cases of consumption are of tubercular origin; every one admits that exercise of the lungs is useful; what is needed then, is a remedy and means of administration that will meet the general indications.

1.—Capable of local application.

2.—Possessing germicidal powers.

3.—Possessing healing properties.

4.—Capable of a dry form of administration.

5.—Administered so as to develop the lungs.

6.—A blood purifier, so that the general system may be improved.

Can such an agent be found? Yes, right under our noses and the noses of our forefathers since the beginning. The supply is unlimited; the demand is steadily increasing. What is the name of this remedy? Oxygen.

Oxygen a Germicide.

When so much is claimed for a therapeutic agent, there must be satisfactory reasons given. You are right in asking for them; the privilege of furnishing them to you will be a pleasure.

1st. Pasteur attenuates virus to the degree needful for inoculation purposes by exposure of the material to a current of O. If, through any error, this current were allowed to flow too long, the material would be rendered inert. Another investigatior subjects the virus to the influence of heat and attains the same object. In this case, too, if the material were exposed too long to a certain temperature, inertness would be the result. Heat is a well known germicide; if O produces the same result on the virus as the heat, the cause must be the same, therefore O is a germicide. I defy the apostle Paul to get over this argument.

2nd. Substances rich in O have long enjoyed a celebrity as disinfectants, such as KMn_2O_7, $AgNO_3$, $KClO_3$, etc., etc., but more than all H_2O_2. O is here held in very unstable combination. H_2O_2 is ready, with a little heat applied, to give off 415 volumes of O. H_2O is water; H_2O is peroxide of hydrogen, the bland-

est, and at the same time one of the most powerful germicides known. What made this change from a substance in which microbes thrive (water) to one in which they cannot live—the change from H_2O to H_2O_2? The answer is apparent. If altering the proportion of H and O, hydrogen and oxygen, makes such a change, is not the thought reasonable that a change of the constituents, of the mechanical compound air would also make a difference? Two atoms of hydrogen and one of oxygen make water; two atoms of hydrogen and two of oxygen make peroxide of hydrogen. Four parts of nitrogen and one part of oxygen make the air we breathe. What would four parts of O and one part of N make? Two parts of O and two parts of N? Germs live in the water, so they do in common air: they die in peroxide of hydrogen, would they not die also in the altered atmosphere above indicated?

3d. Oxygen liberated by a little heat from H_2O_2 will destroy every vestige of pus—to such an extent that not a corpuscle can be seen under the microscope. A recognized axiom stated before is—"There connot be pus without microbes"—the conclusion from which there is no escape—the O destroys the pus and the microbes.

4th. Some way back the microbes were placed in the vegetable kingdom—an order of fungi. In the introduction to this article occurs the statement that O does not support vegetable life. Put a large, vigorous plant in an atmosphere of O and see the leaves wither and die. Where destruction overtakes the vigorous plant surely a microbe's existence would be doubtful.

5th. Fearing that histologists may put the microbes back again in the animal kingdom, would O still be destructive to them? Yes. To the aerobic variety that are said to require O? Yes, for these reasons: Paul Bert proved that condensed O breathed by guinea pigs or rabbits, will enter into chemical combination with the blood and cause death. If the higher forms of life can be destroyed with condensed O, would not a microbe (if an animal) fare badly with ordinary O? Abundance of this element to an existence that thrives in filth and death must be a hell. There is, too, the thought of environment. The larger animals once lived in what is now the frigid zone; they are now

to be found in the tropics. The aphis of the rose will not live in an east wind. Frogs and snakes are not partial to the climate of Ireland. A whale can be killed by keeping him under water and not allowing him to "blow," and take in more O than he can get in the water. Put him on dry land and he will fare as badly. The fish out of water dies, not for the reason that there is no O—there is more than he had in his own element, but the environment is unsatisfactory. *To think that the microbe will fare as badly with a change of environment as the fish does, is reasonable.*

6th. Supposing that the germ theory of disease is supplanted by the theory of ptomaines and leucomines, how will our agent figure in this new role? No trouble to meet this. The advocates of the ptomaine and leucomaine theory admit that these alkaloids cannot be developed except there is a deficiency of oxygen where the process takes place. The indications would therefore be obvious.

Having established the *germicidal* power of O, let us establish the third important factor an agent should possess in order to be applicable to the treatment of consumption.

Oxygen a Healing Agent.

To a certain extent this fact has long been known. Pure air in the wards of hospitals puts the wounds under more favorable circumstances to heal. Where there is plenty of O the air cannot be impure. Soon after Priestly discovered this element, patients suffering from wounds in the hospitals were allowed inhalations. The wounds of patients so treated were seen to assume a healthier appearance. In January, 1886, the thought occurred to me to apply a stream of O locally to a sore, and note the results. The reasoning that led me to take this step was as follows: When an eschar is formed by using HNO_3 (nitric acid), or $AgNO_3$, (nitrate of silver), is not this a form of oxidation? The eschar forms the line of demarcation—divides the healthy tissue from the unhealthy. As this process is accompanied with so much pain and is owing largely to the O contained in the caustic, why not use the O alone? There was at this time under my care a very unhealthy sore, to which a cele-

brated Chinese physician han been applying cold tea. With all due respect to the skill of the celestial and his favorite beverage, the sore had eaten out quite a portion of valuable flesh and presented a sluggish aspect, covered with dark, unhealthy granulations. Upon this sore I poured about ten gallons of O. The patient said he felt a slight uneasiness—I saw the dark, broken-down tissue disappear—the moisture licked up, and toward the end of the treatment the granulations present glowed like a coal. The process of oxidation of the blood took place in each granulation, the thin covering of each one facilitating the process of osmose, as the coverings of the minute air cells do in the lungs. Have made topical applications several times since and always with good results. One drawback to the use of O in this manner is the expense. When a portion of lung tissue is breaking down, how essential to the well-being of the portions remaining would an agent be, the use of which would tend to establish a line of demarcation—divide the healthy from the unhealthy, set up a wall of healthy granulations—limit the field of operation of the destroyer—render inert the broken-down tissue, and at the same time furnish the means for the exit of the same. Will we wait then, gentlemen, on the process of cell building up by cod-liver oil, etc., through the medium of the stomach, etc., or will we come to the rescue through the nostrils, trachea, bronchea—*the air line*, you may say—with an agent ready to do the work as has been shown? The healing powers of O are beyond question, as is the readiness with which it finds way to the place needing help.

Having shown that O is capable of local application, possesses *germicidal* and *healing* qualities, there remain three more of the six points to be proved.

4th. Capable of a dry form of administration.

The O is obtained, as was shown before, by a chemical process in which a high degree of temperature is needed. Although stored over water, as it is in our office, there is a very slight amount of moisture taken up, as can easily be proved by putting a piece of cold glass in the preparation. There is scarcely a trace of moisture deposited upon the surface. Of the utility of the dry form of inhalation there can be no question.

The air breathed *out* should contain moisture. If loaded with moisture when breathed *in*, how can it carry very much more *out*? Everyone has experienced the depressing effects of a sultry day—the lungs are working at a disadvantage. Wounds heal better in a dry climate. Dryness is an environment that is uncongenial to the microbes—dampness favors their work. Long ago an old sailor told me of a climate in South America where the inhabitants never slaughtered their beeves—they simply went out and cut from the living animal what was needed for the meal, knowing that the gap would be filled up in a day or so and ready for use again. He said at the time the climate was dry (he was, too). Although a story, the point is emphasized. One of the beauties of Colorado climate is the dryness. Breathing a damp atmosphere is oppressive to lungs that are well—what must the work be to lungs diseased? Again: diseased lungs, even in an early stage of the trouble, have dirty secretions here and there—on the bronchial tubes, say. May not inhalation carry minute portions of this into the deeper structures of the lungs and deposit centres from which the disease may advance still faster? Inhalations of O will tend to dry these secretions and render harmless the minute portions that might be carried further into the lungs. The sooner these secretions are dried up the sooner will the danger of auto-infection cease.

5th. Agent administered so as to develop lungs.

If we wish to develop any portion of the body we recommend that portion to be exercised. We recommend *passive* exercise for a disabled joint. Patients suffering from lung trouble should have the lungs exercised. The inhaler from which the patient takes the treatment should be graded in such a manner that he can see how many cubic inches he can take—so that he can see an exact measure of his lung capacity. He is first instructed to empty the lungs as thoroughly as possible and then breathe in from the inhaler till every available portion of lung is in use. The lungs thus filled with the remedy are allowed to remain so as long as possible, during which time the person treated may move the arms in such a manner as to allow free access of the agent to the portions of the lungs that ordi-

narily would not be called into use. As the patient inhales, the upper part of the inhaler sinks; if it goes down an inch, as shown by the graded measure on the side, two hundred and eight cubic inches have been inhaled; if it goes down ⅛ inch, twenty-six cubic inches have been inhaled, etc. There is no mystery here. All the patient has to do is to measure the diameter of the inhaler and by a mathematical calculation see what a quarter of an inch, or half an inch in depth, etc., of such a vessel will hold. If one hundred cubic inches go out of the vessel while he inhales, just that many inches have gone into his lungs; if he cannot take any more, then his lung capacity is a good deal below normal. The patient is encouraged to develop the lungs by every day trying to take a little more, and under my observations in the office, as the lung capacity *increased*, the temperature, pulse and respirations *decreased*. The test by measuring capacity is a good one, and, Loomis to the contrary, will confirm every time the results of careful physical examination. The point must not be lost sight of that the lungs can be exercised without putting the whole body in motion. If the lungs are weak, can they stand well the blood's being forced into them by the rapid action of the heart caused by exercise? Is there anything gained by forcing blood into a lung that cannot take in enough air to purify said blood? Why not then give some time to developing the lungs by *passive* exercise? You may say that the lungs begin to decay at the apices first, because, on account of situation, the blood does not get there to nourish them. I may say, and with more reason, that the blood supply diminished in the apices because, on account of situation, their *exercise* was neglected. The blood finds its way to the place needed, as a rule, and nourishes that place, but if that place is not exercised normally, the blood supply will diminish. If John L. Sullivan's arms had been tied by his side, he would not now be making the tour of the world to exhibit what they can do, no matter how much food he might have eaten. Granting that the lungs have begun to suffer at the apices, say, would the idea of forcing the blood there by exercise, be the best method of repairing the defect? If the tissue is undergoing degeneration, would this renewed strain help matters? Would the plan be as successful as

to direct the person to keep the body quiet and exercise the lungs by breathing *in* to fullest capacity, and then breathing out, exercising the lung itself, and thereby leaving a purer blood current in circulation there than if the current were loaded with the wear and tear of the whole system? We must never lose sight of the fact that there is a large amount of force consumed in running the machinery of life itself, and a proper respect for the conservation of force will italicize the importance of passive exercise of the lungs and administering a treatment in such a way as to develop them. All consumption is not tuberculosis. Neither tubercles nor tubercle bacilli are found in many cases. How many cases do we find with portions of lung out of use—the trouble has gone no farther. Our treatment should aim at calling disused parts into use—gently at first, and using more as function is restored. An idle brain is the devil's workshop; an idle portion of lung may play the devil with the whole economy—the idle spot may furnish the very soil in which the minute organisms may find the environment suitable for their work of death.

6th. The agent used in the treatment of consumption should be a purifier of the blood.

Everyone grants that O does this. But many deny that the normal proportion of O in the blood can be changed by any safe artificial methods. In an editorial in the *Medical Record*, January 2nd, 1886, is this statement: "So far as we can learn, therefore, all careful experiments show that in healthy, warm-blooded animals the inhalation of pure oxygen causes almost no increase in the amount of oxygen in the blood." This could be disposed of, as far as the objects of this paper, by saying that the treatment is not intended for "healthy, warm-blooded animals," nor does the treatment consist of giving O alone, but there is no need of being captious in a search for the truth. A person with good lung capacity can hold the breath from half a minute to a minute. After taking ten or a dozen long breaths of O he can hold the breath from two to three minutes. The desire then to exhale seems to be more for the purpose of relaxing the diaphragm than for the need of air. When this is relieved the breathing for two or three minutes more is very slight.

We are aware of the fact that suicide cannot be committed by holding the breath, because accumulation of CO_2, or the absence of O, renders the person unconscious—the effect of the will is overcome and breathing is resumed. Ordinarily we breathe eighteen times a minute; what makes the change possible, from eighteen breaths in one minute to one breath in two or three minutes? There must be an extra amount of O appropriated in the latter case—if so, the blood must have taken up more or been better prepared for sustaining the life processes by the preparatory inhalations. The residual air may become largely O. I have sat down by a sixty gallon tank of O and inhaled the whole amount, noting pulse beat, temperature, etc. When done, there was a warm glow over the body—the cheeks very red. To my mind this suggested the action of O—there had been an impetus given to the growth of hæmaglobin. If this were done in my case, would not the chances be still better where that substance is below the normal amount? In other words, O stimulates hæmatosis just as iron is believed to do. These experiments have been made on myself—I am willing at any time to make them before this society. If the editor of the *Medical Record* had tried on himself, he would have known more. Experiments on the lower animals are useful, but experiments on a person's self are more convincing. A physician unwilling to investigate the merits of an agent on himself first, is unworthy the calling. Of course the fact must not be lost sight of that a man may fall in love with his own theories, and as love is blind to deficiencies and utterly unscientific, the dangers of the theorist is imminent. A person lame bodily knows his infirmity, or, at least does not think it a superiority; but a person of lame mind (and love of a pet theory will lame the mind) is so far from knowing his infirmity that he commonly deems himself superior to those who are well formed mentally. He can see himself reflected bodily in a glass,' and so project his body mentally; he cannot by any ingenuity of introspective skill see his mind and project it into an object of external apprehension—cannot contemplate his own contemplating faculty—appreciate his own appreciating powers. Realizing the truth of these facts there has been a constant endeavor, on my part, to go to nature first and

learn from her, and not so much to get a theory and then distort everything to suit the theory. If you find me napping, "Pity me not," as the ghost exclaims in Hamlet, "but lend thy serious hearing to what I shall unfold," wisely considering or instinctively feeling, as Shakespeare did, that pity was incompatible with exact attention and sound judgment.

There is an objection to the oxygen treatment that should be answered here. Many contend that the treatment occupies such a short time—half an hour once or twice in the twenty-four hours—that there cannot be much good accomplished. Let us investigate this objection. When you order a patient cod liver oil three times a day, when do you expect the good results? Is the good accomplished when in the mouth, in the gullet, in the stomach, in the intestines, in the blood, or is the good accomplished at the very time when, freed from all extraneous matters, cell transformation takes place—force is liberated—the new cell takes the place of the old? This latter object is the one for which we give the cod-liver oil, and we all know cell proliferation is no slow process. Let us remember too, that this long process through mouth, etc., drew upon the reserve force of the body which the physician in his treatment as pointed out before, should zealously guard. The inhalations occupy a short period of time, to be sure, but a minute's presence of an excess of O may be an eternity to a mibrobe and at the same time may touch millions of cells with the glow of energetic life. A whiff of hydrocyanic acid will snap the brittle thread of life for any of us. Is *time* the factor here? Herbert Spencer clearly shows in his Synthetic Philosophy, that Time, though a necessary datum of intelligence, yet a psychological analysis shows us it is built up of or extracted from experiences of *force*—the ultimate of ultimates. We know that *motion*, too, is traceable to the experiences of force—and as Mr. James Hinton sets forth in the *Medico-Chirurgical Review* for October, 1858,

"Organic form is the result of motion,"

"Motion takes the direction of least resistance,"

"Therefore organic form is the result of motion in the direction of least resistance."

And we may add, organic form is the result of force. Some

time ago we stated that a man can live forty days without food, but not five minutes without oxygen—food represents force—yet oxygen must be almost force in itself, because of its immediate need. The objection, then, that O can be of no use because of the short period of its exhibition, is untenable and would only be made by a person that catches a word, uses the word for the sound, paying no attention to the fact that words are vehicles for ideas—not the ideas themselves. There are many pleasant fields of thought suggested here which at some future time we may cultivate without at all running the danger of becoming the apostles of the so-called Christian Science.

You may criticise me for introducing a portion of my paper that some might think should be placed first—the curability of phthisis. If nothing can be done for the unfortunate victim, why waste so much time in trying to prove that we have a grand agent to do an impossible piece of work? Von Molke laid all the plans for the Franco-Prussian war—then met the enemy. That was called good generalship. The very thoroughness with which every matter of detail was carried out before his army was set in motion, presaged victory for his *forces*.

Following out the line of argument shown in the last few pages, the steps seem to lead us to what must be considered briefly, as space and time will not permit as careful an investigation of the subject as its merits deserve.

Curability of Phthisis.

The question of heredity stands out pre-eminently here. If we find from the patient's history that consumption has been in his family, do we not look on his case as almost hopeless? Dr. Didama, of Syracuse, N. Y., in an introduction to a discussion on Tubercular Consumption at the New York State Medical Association, November, 1886, asks the following questions and makes the adjoined statements:

"*In addition to a feeble vitality, which may be derived from parents who are, or are not consumptive, do the children of consumptive parents inherit tuberculosis itself or any special phthis-*

ical taint or tendency?" "In a paper entitled, 'Is Tubercular Consumption ever Inherited?' read at the last meeting of the Association, the writer discussed this question at some length. Further investigation and reflection have but strengthened the convictions and opinions then expressed, that, as a rule, with few exceptions—and, possibly, with not a single exception—the unborn or newly born child of a consumptive parent is entirely free from tuberculous disease, taint or tendency. That tubercles themselves are not found in the lungs of the fœtus or of the very young babe, is the latest testimony of the best observers. That the new-born babe of a consumptive mother, when instantly removed from unhealthy surroundings and influences, and shielded from bacillic infection, is likely to remain free from tuberculous disease, is also a well established fact. That a vast majority of those who die of consumption are born of parents who are entirely free from lung disease, is the unimpeached testimony of individual observation and of the statistics furnished by consumption hospitals and life insurance companies. The fair inference from these facts seems to be that consumption is acquired, not inherited; that the so-called phthisical taint or tendency is simply an impaired resisting power—a vincibility of cells—which may be inherited as well from non-consumptive parents as from consumptive ones, or may be acquired without inheritance; and that, in the contest unceasingly waged between cells and destructive organisms, the vigorous cell may effectually resist, while vincible ones are easily overcome and destroyed."

In a text-book of medicine, by Dr. Adolf Strumpell, of Leipsic University, which, by the way, is used in Harvard University, in this country, we find the following: "We now believe that many evil influences which were once thought to be causes of tuberculosis act only in increasing the disposition to the disease. Insufficient food, bad air, severe illness, childbirth, want and care—these alone, of course, can never produce tuberculosis, but we can easily imagine that the body which has become weakened affords less resistance to the injurious influence of tubercular poison than does the strong and healthy body. People often used to speak of the transition of other affections of the lungs into pulmonary consumption—that is, into tuberculosis.

It was imagined that an old bronchial catarrh, croupous inflammation of the lungs, or catarrhal pneumonia in measles, or whooping-cough could readily become tubercular. It goes now without saying, that such an idea is no longer tenable, after the demonstration of the specific infectious nature of tuberculosis." Further on he says: "Tuberculosis, as a rule, is not inherited, but only the disposition to tubercular disease." R. Douglas Powell, M. D., London, says: "The tendency of modern inquiry is to range all the conditions which have been hitherto regarded as causative of phthisis, on the side of *predisposition*, *i. e.*, as conditions which bring about a state of receptivity, if I may say so—a capacity on the part of the tissues to receive and harbor with hospitality a certain organism, and on the other hand to regard the exciting cause as one and single—that organism, the tubercle bacillus. * * It is impossible at the present time to discuss the etiology of phthisis without first facing this question which is at the root of the matter, viz: the relations of the bacillus tuberculosis to the disease." * * * *

"Attempts have been made to throw some doubt upon the reality of hereditary influence in the etiology of phthisis. The reality of this influence, however, is only too certainly a matter of experience, and did it need demonstration, such may be found in the account of eighty families of consumptive parentage given by Dr. R. Thompson, of which there were born three hundred and eighty-five children of whom one hundred and ninety-four became pthisical, and thirty-seven died in childhood, leaving only one hundred and fifty-four exempt."

"(1.) The effects of so-called hereditary influence in leading to phthisis, have been regarded as attributable to contagion from the parent subsequent to birth, either directly or through the milk. If this were so it would obviously follow that maternal 'inheritance' should be far more deadly and earlier manifested than paternal. For the child is from earliest infancy in more constant association with its mother, and infected milk supply of paternal source can only come from the mother. Nothing of the kind is observed in practice, however, and statistics show (a) that the 'influence of *paternal inheritance* is especially developed before twenty-five years of age, being loaded upon the period

between ten and twenty-five, the acme of susceptibility being exhibited between twenty and twenty-five:' but that (b) with regard to maternal inheritance 'susceptibility is not marked before fifteen, but is especially loaded on the period from fifteen to twenty-five, the acme being reached between twenty and twenty-five.'"

"(2) It is said that inheritance in part arises from transmission of the virus in the manner in which syphilis is transmitted, and manifests itself early in life in the form of scrofula or meningeal or peritoneal tubercle. Careful observations of the manifestations of scrofula in the form of caseous glands or diseased bones, undoubtedly favors the view that they are predisposed to by constitutional states, but it is also convincing of the fact that they are called forth by local injury or distal irritation; a scratch, a cut, an eczema, a carious tooth, an otorrhœa, a catarrh of the bronchi or bowel, begets gland irritation and caseation follows. The manifestations of syphilis have, on the other hand, in their independence of such exciting causes and in their symmetry and early developmental features, the special characters of a blood disease: of course, in the many cases in which inheritance is not immediately from one or other parent, any comparison with syphilis is impossible."

"(3) A third hypothesis, which is in accord with previously held views, and the most recently advanced as to the nature of the disease, is that suggested rather than expressed by Dr. H. Weber, in his recent lectures at the College of Physicians, viz.: that phthisis is inherited as a predisposition, an inherent quality of soil favorable to the development of phthisis, but which yet can only be fertilized by the specific spores of that disease. This may of course be so: there are abundance of spores about, and it comes to be almost a mere matter of account whether the phthisis be attributed to the spores or to the morbid state of the tissues prepared for their delectation. In its transmissibility from either parent, its occurrence consequent upon, or in anticipation of, declared disease in the parent, in its declared presence being not protective from, but predisposing to future attacks, and in the fact of atavism being a frequent and important characteristic, phthisis is, with regard to heredity, strikingly differ-

ent from syphilis and zymotic diseases and strikingly in accord with insanity and trophic diseases." (Thompson).

"A careful and impartial examination of the cases which come before us cannot fail to convince that neglected catarrh is the most common exciting cause of phthisis, although there must for the present be some difference of opinion as to the connecting link between the consequences of simple catarrh and the onset of phthisis."

The reader may select the pith from the views of Dr. Didama, of America, Dr. Strumpell, of Germany, Dr. Powell, of London, reconcile apparent contradictions and then ask himself the question—Is it possible that heredity may be eliminated and that there is hope for the children of consumptives? The question of environment comes in here. There will always be a difficulty found in separating the child from the parent, no matter how science may point out the necessity. A knowledge of the fact, though, may be useful to all. Because the parents died of consumption we need not write the death certificate of the children. If the children die, there should be no consolation to us in the expression, "God's will be done." True enough, but he never willed that the physician should lay that comfort to himself. Let the people in their kindness say so, but our duty is to work and not hide from the truth.

In the early part of the present century consumption was regarded as almost universally fatal. "No fact," says Andrae, demonstrates that phthisis has ever been cured, for it is not art which operates in the cicatrization of cavities." Louis admits that a cure may rarely take place, but the disease must then be limited, and "the result is fortuitous." In the last thirty years or more, however, since Professor Hughes Bennett began to advocate the sthenic treatment of the disease, the views as to its course and termination have greatly changed. He says that phthisis is "not considered to be uniformly or even generally fatal," and that treatment can in a great majority of cases, prolong life, while in many "a complete and permanent cure may be effected." The inference is also drawn from post-mortem examination that one-fourth to one-half of persons who die after the age of forty have had an apicial phthisis which was cured.

Dr. Richard Quain and Dr. James Henry Bennet have expressed similar hopeful views. Dr. James R. Leaming states his belief that nine-tenths of all forms of phthisis commence with interpleural exudation, "which is removable, when fresh, by proper management;" from which the inference is to be drawn that nine out of ten of cases of incipient phthisis can be cured. Professor A. L. Loomis says that chronic pulmonary phthisis is not necessarily a fatal disease. Dr. Roberts states that there is ample evidence to prove that phthisis may, in certain ways, be completely arrested or cured. Niemeyer believes that in the forms of the malady dependent on pneumonia, recovery is often possible. Statistics of the Registrar-General of England show that phthisis does not cause so many deaths proportionally as it did in former years. These opinions are cheering. They may come largely from the gentlemen who write our text books and who are brought more in contact with patients that can travel North, East, South, West, as their cases may require—able to have good rooms, good food, good attendance. Physicians attending such patients are likely to be optimists, believing that "If this world be not the best possible, God must either, (1) not know how to make a better, (2) not have been able, (3) not have chosen. The first position contradicts His omniscience, the second His omnipotence, the third His benevolence." Physicians in the best practice are likely to express optimistic views. The country doctor who treats the farmer's wife or the small tradesman, and the city doctor who treats the mechanic, the clerk, the domestic and the laboring man, may have a different story to tell—may be more inclined to pessimism—taking the most unfavorable view of everything in nature, and thinking that the present state of things only tends to evil.

That there are difficulties surrounding such an important problem as the "curability of phthisis," is nothing wonderful, for the most simple problems of everyday life are so surrounded to the thoughtful man. It is our duty as physicians to try to look as near to the bottom of things as possible—the very effort will do us good and cause the light to shine in many a dark recess. Looking so and thinking so a child in school should receive as good a mark for a well developed chest and good lung capacity

as for the ability to solve a difficult mathematical problem, for instance. The environment of the family should be watched and the environment of the child guarded.

This brings us to a portion of our subject of first importance.

Prophylaxis.

This will be the field of the physician in the future, and in no disease will his skill, his knowledge of *forces*, his understanding of environment be more thoroughly tested than in the treatment of consumption. If, for the good of the child, born of consumptives, he sees fit to order a change of surroundings, fully explaining his reasons therefor, would he not still be a physician, standing by both mother and child, helping on the work of life? Are those physicians now that counsel consumptive parents to have recourse to dirty tricks to prevent conception, on the ground that the progeny would be puny? Are those physicians now that to prevent the entrance of a puny race, kill the child and kill the mother very often? That is prophylaxis with a vengeance—that vengeance will recoil.

The physician of the future will have prevention of disease as the chief object in view, and with a keen eye to lung capacity, etc., will guide the parents in their choice of occupations for their children—he will "*bump*" the chest for them and make a better selection than the so-called phrenologists do now. He will see that the sputa of consumptives will be ejected into receptacles in which the tubercle bacilli will be destroyed. There will be strong reasons given why no one should engage in making cigars—the fine tobacco dust having proved itself to be a powerful irritant of lung tissue. The very best lungs can scarcely endure this irritant and the close confinement in the cigar-maker's trade. Persons with weak lungs should not attempt such work.

Weak lunged persons should also be counseled to not engage in stone-cutting, janitor work, scissors grinding, or any other occupation where dust or fine particles of any kind abound. Many other things to be avoided could easily be pointed out, but there is no necessity to dwell further on this part of the subject.

Allow me now, gentlemen, to introduce to your attention a consumptive, and let us see him through "a course." If, in the office he enters, there happens to be a physician that prides himself on his exact powers of diagnosis (all very well—but not *all*) the unfortunate is subjected to what is supposed to be a rigid examination, the doctor saying such words as "tympanitic," "crack-pot," "normal vesicular respiratory murmur," "amphoric," "percussion note," "consolidation," "partial consolidation," "apicial softening," "pleurétic adhesions," "vomicæ," etc., etc., etc. When the patient is exhausted and the doctor almost, the latter sits down and soon is filled with inward satisfaction when he thinks of the "accurate diagnosis" he has made. A glance at the tongue suggests that the liver is out of order—must have something to work on that. The rapid pulse demands digitalis. The burning fever must be controlled by either quinine or salacylic acid. The patient speaks out now and says, "Doctor, I would be all right if I could get rid of my cough." The doctor bethinks of a cough mixture that has done him good service and that of course contains *morphine* or *codeia*, as the very thing the patient wants. Then, too, a rapid subsidence of this troublesome symptom will give the victim great confidence in his supposed benefactor. The patient too, has troublesome night sweats? Atropia or dilute sulphuric acid, agaricin or picrotoxin. The "heavy weight" at the pit of the stomach suggests pepsine and the emaciated form speaks loudly for cod-liver oil in some form or other, or sherry and egg, or "Old Crow whiskey." Then, too, there is the trembling of hands—nux vomica. Six prescriptions are written to meet the *symptoms*, and the patient leaves the office, warned to go to just such a drug store, for only in that place can be found a man skillful enough to compound six prescriptions, with perhaps forty or more ingredients, to find their way into one stomach and get out again and make the owner feel better! ! Gentlemen, this picture is not overdrawn. In my house resides a young lady that came from Chicago two years ago on account of lung trouble. She went to a physician here who is somewhat of a specialist in that line. She left him with six prescriptions, had them filled and went home to fill herself and grow fat. The stomach in its kindness rebelled against such treatment. The

patient, though well grounded in the faith, was compelled to seek advice from one whom we consider out of the regular line. He had sufficient sense to recognize the fact that the stomach is not a test tube into which you can pour ingredient after ingredient or compound after compound and look for reactions that will ultimately benefit the lungs, or for that matter, any other part of the economy. This last named physician paid some attention to the diet of his patient, and gave her no medicine. She improved and has been at work more than a year. Had she continued deluging her stomach as before indicated, the consequences can easily be imagined.

If you notice in the so-called "course" there was not a word said about local treatment—the "accurate diagnosis" was founded on *local* observation, but the treatment was *general.* Will the scientific medicine of to-day stand such nonsense disguised as coming from a true source? The people will not endure this. One of my patients said the other day that he questioned his former physician in reference to inhalations. The physician made light of the matter—said nothing of any value could get into the lungs that way. In the meantime, says the patient, he advised me to keep away from thrashing machines, because the dust would be injurious. The patient queried thus: "If there are particles of dust fine enough to get into the lungs to their injury, could there not be medicine fine enough to enter the lungs and heal them?"

This brings us to the rational treatment of lung troubles, consisting in local and constitutional methods combined.

We will now consider some of the important symptoms that are noticed in consumptives, and see how our agent acts in removing the cause.

Pyrexia (fever).

The development and regulation of animal heat are among the most interesting of vital phenomena, and perturbations of this process, as illustrated in fever and in the abnormal temperature of the insane, are of the deepest import to the physician. While we do not yet know the intimate pathology of fever, our know-

ledge of its phenomena, of the conditions attending it, is vastly greater, and our conception of its nature much more clear and satisfactory than was the case even a decade ago. In fever there is relatively ar increase in the production of heat, and an increase in its radiation. The amount of carbonic acid gas and of urea excreted is increased. This increase in heat has been thought to be due simply to an increase in the metabolism or disintegration of tissue, and some investigators have brought forward considerable evidence to show that such increase of chemical change is due to the nervous system letting go its hold on the metabolic process; that there is, in other words, paralysis of a certain inhibitory thermic centre. But it is not possible, according to some authorities, to explain the great production and loss of heat occurring in fever by the fact of an increased chemical activity.

Dr. W. M. Ord, in his presidential address before the London Medical Society, offers a further explanation which is striking and ingenious. It is generally admitted that in the process of building up the complex tissues from the simpler food products there is a loss of heat, *i. e.*, it is rendered latent. This view is strengthened by certain experiments of Dr. Ord upon the growth of plants. In fever this constructive process is disturbed, heat is not locked up as it should be, but continues kinetic, and goes to join the heat produced by excessive tissue combustion. There is then in fever, through disturbed nervous influence, interference both in the constructive and destructive metabolic processes. There seems to be a flash of insight in Dr. Ord's theory. In this connection a letter from Dr. Charles A. Rayne to *The Lancet* is of interest:—"One day last week, during an ascent of one of the lake mountains, nearly three thousand feet in height, I made the following observation. When half way up, and during the ascent of a very steep and rugged bit, I took my temperature in the mouth very carefully. It was 95.5°, though I was feeling very hot at the time, and respiration was largely increased. When nearing the top, and walking leisurely up a slight incline, I again took it, and found it 97.5°. After resting at the top some time, and feeling chilly in a cold wind, it was 98.6°. These experiments are not new. I tried them some years ago with similar results, and I believe they were first made

public in a letter from the pen of Dr. Tempest Anderson, published in *Nature* ten or fifteen years ago. Their bearing on the problem in question is evident. During the raising of the body to the height spoken of these experiments seem to me to point to the fact that there is largely increased constructive metabolism, probably in the muscular tissues, and a locking up of heat in consequence, resulting naturally in diminished temperature of the body as a whole. A similar explanation may not improbably explain the normal variation of temperature observed in health."

The editor of *The Medical Record* commenting on the recent Gulstonian lectures by Dr. MacAlister, has the following:— "It has been heretofore considered that the motor and heat-making functions were in very close relationship. We have come to learn, however, that this relationship may be profoundly modified in the living organism. The motor function may persist while the thermogenic or heat-making function may be in abeyance. The latter is now regarded as being directly under the control of the nervous system—so far at least as its regulation and distribution are concerned. 'Wherever,' says Foster, 'metabolism of tissue is going on, heat is being set free.' It is not a new idea that the nervous system controls this important function. Positive evidence, however, has been slow in accumulating. Half a century ago Brodie called attention to the fact that the temperature rose after injuries to the spinal cord. Tscheschichin noticed that in rabbits after section of the cord a fall of temperature occured, but that a section carried through the line of junction of the medulla with the pons caused a marked rise. The latter fact suggested a 'heat centre' in the high nervous structures. "Dr. MacAlister regards the heat of the body as coming from a substance, thermogen. Stimulation of certain nerves connected with the centre gives rise to its destruction. This metabolism liberates heat, and these nerves are called catabolic. Stimulation of other nerves (anabolic) causes a reformation or restoration of this thermogen. There is a close relation between this heat centre and the motor area. This correspondence is what we might naturally expect in view of the association of motor activity with heat formation. The exact location of the heat centre we are not sure of. Sachs and Aronsohn found that

stimulation on the inner side of the corpus striatum caused a rise in temperature."

There is no doubt that we have come to a new era in the study of the temperature of the body. The use of the thermometer may become empirical in our hands. Looking for causes never will become so. The use of quinine for every case of fever has been shown to be empirical.

Quinine, salacylic acid, etc., are of very little use—often do positive injury—when given to reduce the fever peculiar to consumptives.

Oxygen, by its near relation to force, reduces the fever in consumption. It tends to restore the equilibrium between the heat producing and the heat distributing centres. A phthisical patient with a temperature of 103° may have it reduced to normal by inhaling oxygen, with no injury to the stomach, no after consequences but general improvement. The reason for the use of O in this connection is obvious.

Coughs.

This is a common symptom in consumption. Coughs may be divided into useful and useless. In the greater number of cases the cough is useful. It is the finger-board pointing to us where the danger is—the lighthouse showing the rocks of the dangerous coast. Is it sensible to stop the cough that is getting out a foreign body—a useless part of what once seemed to be ourselves? Is it wise to destroy the finger board? Is it sensible to destroy the lighthouse? Would it not be better to get near the cause, attack it in its home? Blow up Hellgate, remove the debris and soon the lighthouse may be taken away. It is not a very difficult matter to stop the useful cough; there is not much trouble required to diminish the amount of sputa. A cough-mixture containing an ever increasing quantity of opium will come near doing both, but at what a frightful expense to the unfortunate sufferer! Have we not seen the appetite fail, the bubbling sound in the lungs doubled, the powers of motion diminished, the will power reduced to a minimum, the incline to the tomb greatly increased by this senseless procedure?

If there are no hopes for the patient some may think the use of opium advisable. Such should always remember the scene between Napoleon and the physician in the plague-stricken wards of the Joppa hospital. Napoleon looked at the sufferers and suggested the administration of morphine to cause death, and thus end all sufferings. The physician replied,—"Sire, our business is not to kill."

Oxygen, governed by the action of nitrous monoxide diminishes the cough by getting rid of the cause, keeping up the strength of the patient while the offending material is being thrown from the system. As a rule the cough soon begins to improve when oxygen is used, for the reason pointed before, and that must never be lost sight of—*the cause* is being removed.

The *useless* cough comes as a reflex, the cause of this reflex should be studied: the reflex from an accumulation of sputa (producing usuful cough) requires a different method of treatment from the reflex caused by a prolonged uvula,—either can produce the cough—the cough cannot be benefited in either case by treating the wrong place. The knife will be the thing to use in the case of the long uvula that tickles the throat and brings on the cough. Oxygen is the thing to use to get rid of the sputa or pus that may accumulate in the bronchi and cause the cough.

Sweating.

Various causes are given for this symptom in phthisical patients. Occuring during the night when the number of inhalations to the minute is reduced, (as happens during sleep,) some consider the cause to be the increased amount of carbon dioxide in the blood. Since the temperature runs down during the sweating period, is the thought not tenable that the distribution of force has more to do with this? When steam begins to pass from the kettle's mouth, the bottom of the kettle is not as hot as before this takes place. Atropia is given to control sweating. This the drug does, but the thirst produced is very great and the surface of the body becomes uncomfortably hot. Oxygen very much improves this trouble, because the friction is removed from

the life processes, force is conserved by the use of an agent that imposes no additional task on the necessary life machinery. Have had several remarkable cases in which this symptom changed for the better after the first treatment and continued to improve.

Condition of the Skin.

This is very important; the reasons are manifest. The lungs, which are the great oxydisers of the blood, are in structure very little different from the skin, the difference between them being more those of position than organization; the mucuous membrane of the lungs is an inverted skin, while the skin may be considered as an everted lung. Sir Alfred Power writes:—

There's a skin without, and a skin within,
A covering skin and a lining skin;
But the skin within is the skin without,
Doubled inwards and carried completely throughout.

The palate, the nostrils, the windpipe and throat
Are all of them lined with this inner coat,
Which through every part is made to extend,
Lungs, liver, and bowels from end to end.

The outside skin is a marvellous plan
For exuding the dregs of the flesh of man,
While the inner extracts from the food and the air
What is needed the waste of the flesh to repair.

Too much brandy, whiskey, or gin
Is apt to disorder the skin within,
While if dirty and dry, the skin without
Refuses to let the sweat come out.

Good people all, have a care of your skin,
Both that without and that within;
To the first, give plenty of water and soap,
To the last, little else but water, we hope.

But always be very particular where
You get your water, your food, and your air,
For if these be tainted or rendered impure,
It will have its effect on the blood, be sure.

The food which will ever for you be the best
Is that you like most, and can soonest digest.
All unripe fruit and decaying flesh
Beware of, and fish that is not very fresh.

Your water, transparent and pure as you think it,
Had better be filtered and boiled ere you drink it,
Unless you know surely that nothing unsound
Can have got to it over or under the ground.

But of all things the most I would have you beware
Of breathing the poison of once-breathed air;
When in bed, whether out or at home you may be,
Always open the windows and let it go free.

With clothing and exercise keep yourselves warm,
And change your clothes quickly if caught in a storm,
For a cold caught by chilling the outside skin
Flies at once to the delicate lining within.

All you who thus kindly take care of your skin,
And attend to its wants without and within,
Need never of cholera feel any fears,
And your skin may last you a hundred years.

For preserving the proper functions of the skin, the Turkish Bath has been a valuable agent in my hands. The skin working as it should, helps the lungs and kidneys in their work; too much work on any organ spoils the harmony of the system. To patients too far advanced we would not recommend the Turkish Bath, neither would we recommend oxygen or any other remedy.

We will now leave symptoms, etc., and pass on to—

Climate.

To maintain that patients with phthisis in the East would be as much benefitted by a course of O treatment there as here.

would deny the great value of high altitude in the treatment. This would be as foolish in us as to advise eastern physicians to send all such patients to Colorado. As pointed out before, some are sent here to die, a most cruel procedure. A writer to *The Lancet*, October 30, 1886, gives useful information on the subject, "altitude:"—"The three chief characteristics of the climate of high altitudes are purity of the air, aerial rarefaction, and cold. Purity of the air being equally essential in all types and stages of phthisis, we cannot derive from this factor any help in the selection of cases for the mountain treatment, but the due consideration of the remaining two is capable of affording valuable instruction and guidance. The atmospheric rarefaction throws a greatly increased strain upon the circulatory apparatus; hence we conclude that valvular disease of the heart or feeble circulatory power is a strong contraindication against the adoption of the high-altitude treatment. For a similar reason this method of treatment is inapplicable to persons of advanced age, in whom the arteries are likely to have undergone more or less senile degeneration. The rarefaction of the air increases the number and depth of the respirations, and promotes the elimination of carbonic acid from the pulmonary epithelium. Hence it presses hardly upon those who do not possess a sufficient remnant of functionally competent lung to react to the increased strain thus thrown on the breathing apparatus. Cases, therefore, in which there is extensive destruction of lung tissue are unlikely to profit by the high-altitude treatment. It was long thought that hæmoptysis was a contraindication to having recourse to the mountains—an idea founded no doubt on a mistaken analogy drawn from the experience of mountaineers, who not uncommonly suffer from epistaxis or melæna during their expeditions. Now, no fact in connection with this question is better established than that hemorrhage is rare at high altitudes, even in patients who suffer repeatedly from it while resident on the plains. A little reflection will show that there is no real discrepancy between these apparently divergent phenomena. The conditions of blood-pressure at the orifices of the body and in the lungs are not only not identical, but are actually reversed. Anæmia or congestion at the surface of the body implies an opposite con-

dition of the viscera, and among them of the lungs: hence the fact that epistaxis occurs at high elevations, so far from warranting a dread of hæmoptysis, is rather a ground of security against its occurrence. The prevalence of cold at high altitudes leads us to conclude that cases of phthisis complicated by renal or rheumatic affections, are unlikely to benefit by this line of treatment. We infer, also, that sufficient constitutional vigor to resist the depressing influence of low temperatures is a *sine qua non* of a successful result: but it must be borne in mind that, while the shade temperature at Davos may be many degrees below, the thermometer in the sun often registers as much as one hundred degrees of heat. This sharp contrast between the sun and shade temperatures is one of the apparent drawbacks to the climate at high altitudes, but the risk of chill is to a very large extent obviated by the extreme dryness of the atmosphere. The combination of cold, dryness, and rarefaction constitutes a climate of a highly stimulating type: hence we should expect to find that phthisical patients of the neurotic temperament would be unduly excited by it, while the torpid and phlegmatic might be expected to profit from such stimulation. Organic nervous disease, marked functional nervous excitement, especially hysteria, and persistent sleeplessness, are, on similar grounds, likely to prove strong contraindications to the adoption of the high-altitude treatment. The nature of the response of the organism to disease may afford us valuable guidance in this connection. Where high temperature, rapid emaciation, and much prostration indicate profound constitutional disturbance, we may conclude that the mountain treatment is inapplicable, the probability being that it would tend to aggravate the inflammatory processes and precipitate the fatal issue, which is but too certain to ensue in such cases, whatever line of practice be adopted. On the other hand, cases of chronic and stationery phthisis, with slight constitutional disturbance, are likely to react favorably to the stimulating properties of the climate of high altitudes. The foregoing conclusions, which are fairly deducible from a due consideration of the conditions of the case, are verified by practical experience. The cases that do best at high altitudes are those of simple phthisis in patients who are free from cardiac, renal, or rheumatic com-

plications, and who exhibit a torpid reaction to the disease. Many cases of respiratory disease, other than phthisis, benefit strikingly by the high-altitude treatment, notably cases of delayed convalescence from pneumonia and fibroid pleurisy. Here the explanation is not far to seek. Such cases need before all things a stimulation of the vital powers to enable the affected organs to rid themselves of morbid deposits and resume their normal functional activity, and this stimulation is precisely the most essential physiological effect of the mountain climate. The only precaution necessary in such cases is to guard against a premature adoption of the high-altitude treatment. In early convalescence, where there is still some lingering pyrexia, with feeble digestive power, such a line of practice would run the risk of promoting a recrudescence of disease, but at a somewhat later stage its value is alike theoretically evident and demonstrated by experience."

Eastern physicians would do well to ponder every statement in the article. The climate of Colorado is unsurpassed, but there is no well authenticated case of its having raised the dead. There are more than a hundred well authenticated cases where consumptive patients have died either on their way here, or at the Union Depot, Denver, or a few days after their arrival. The climate was not to blame—our almost continual sunshiny days and cool nights, magnificent mountain scenery, refreshing breezes from snowy peaks—these were innocent the deaths. The physicians that sent them here, with perhaps scant means, to die in a third-class hotel, away from home, away from loving friends, have much to answer for. Colorado physicians may be some to blame—they have been guilty of "booming" the climate. The truth is all that is needed. A physician writing from Denver a few years ago spoke of holding picnics in January. Though this may have been possible, yet the statement is calculated to mislead. As a rule the people of Colorado do not go picnicing in January. Have seen the very physician that wrote this with his ears wrapped up in January, and he was not on his way to a picnic. Thousands of consumptives that came to Colorado are well and hearty to-day. A great many that came here went *over the range*. If eastern physicians will give a little more

study to the subject of climatology, and if western physicians will report only scientific facts, the benefit to consumptives will be very great. Many that come to Colorado depend entirely upon the climate. They have been so thoroughly drenched with medicine before coming that the thought fills them with disgust, they determine to throw off the vile bondage. Some do very well; others do well for a time and then relapse. If the latter class would have helped nature just a little during the struggle that was almost crowned with success, all might have been well. A well person that goes up 5000 feet in a ballon needs a few words of counsel from one that has been there—a sick person that comes to Denver (more than 5000 feet above sea level) would certainly be the better of some plain truths suited to his present surroundings.

Report of Cases.

I have made no attempt to pick from the many cases that have taken the oxygen treatment a select number. You will find the successes and the failures reported. There has been a studied effort to not put down a word that would either mislead the profession or the patients. Scientific methods need no lying or designing words to recommend them to the thoughtful.

Many that delight in the technique of lung therapy and roll certain phrases, referred to before, as sweet morsels under their tongues, will say that my examinations of the lungs are not up to the standard of a Loomis, a Flint, or a Palmer. I court the criticism, and say in rebuttal that to give the capacity of the lungs in cubic inches saves a great deal of talk and tells far more than a whole page of technical phrases. There is no intention to ignore the importance of physical diagnosis. My effort is to do all in my power to make the examination of the lungs rational, and the treatment, as shown by the following cases, capable of meeting all the indications of a sufferer from lung troubles.

CASE I.

W. E., male, aged 25 years, native of England, in this country seventeen years, resident of Cleveland, Ohio, eight years, machinist. Father a healthy man: mother troubled at

times with asthma. Caught cold in September, 1884, by sitting on the damp ground in the parks. A severe cough soon set in. Began taking medicine for cough a month after its appearance. There was no improvement. Advised to come to Denver. Temperature before coming 103°. Reached Denver October 15th, 1885. At that time felt stronger than at the present. One month after arriving in Denver began to be troubled with severe pains all over the body, but particularly in the hip joints. Treated with a quack from December 28th to January 28th. He pronounced it a case of catarrh, promised a cure in four months, and treated him by blowing some kind of a powder in the nose and throat, and damning the patient for coughing out the powder.

April 15th.—Examination of lungs revealed dullness of percussion note over upper lobe of left lung. Bronchial breathing in this region. Rales heard distinctly over the whole of the left lung. Inspection revealed motion of left lung very much diminished. Expansion by measure, 1½ inches: capacity of lungs, 78 cubic inches: temperature (afternoon), 103°: pulse, 142; respirations, 22; cough, dry; sputa, scant; cervical vertebræ, tender to touch; appetite, poor; patient very despondent.

Placed on the following line of treatment: O & N_2 O in proportion of 2 to 1; four inhalations morning, noon and evening. Kept a record of temperature, pulse and respirations at each visit. It would be tiresome to repeat these figures, although their significance is well worthy of attention. The following is a record of condition at end of each week of treatment:

April 22nd—Temp. (P. M.), 102°: pulse, 130; respirations, 20.
" 29th— " " 101 1-5°; pulse, 112; " 18.
Air entering left lung more freely, cough is softened, sputa comes up easily. Capacity of lung increased to 104 cubic inches.

May 6th—Temp. (P. M.), 100°; pulse, 108; respirations, 18.
" 13th— " " 101 1-5°; pulse, 96; " 18.
" 20th— " " 99½°; " 104; " 18.
" 21st— " " 99 2-5° " 104; " 18.

On this day (May 21st) the patient left Denver for Cleveland, contrary to my wishes. Expansion of chest by measure had increased from 1½ inches to 2½ inches, capacity of lungs from 78 cubic inches to 156 cubic inches, air entering upper lobe of left lung freely. The cough was very much better, expression of countenance animated- was able to enjoy a laugh. Had he remained here he would have made a complete recovery. At last account he was not doing well. The dampness of Cleveland is too much for his lungs to bear. [STILL LATER.—Patient died.]

CASE II.

C. L., male, aged 25½ years, native of Rhode Island, weaver; father alive and well; mother died of typhoid fever. Began working in the woolen mills when fourteen years of age. Has been sick for over two years, coughing for one and a half years. Consulted fourteen doctors. The last one advised change to the climate of Denver or California. [Very indefinite advice, you will say.]

Condition May 5th, 1886 (at noon.)—Inspection revealed a badly formed chest (barrel-shaped). Circumference at forced inspiration, 28½ inches; forced expiration, 27 inches; capacity of lungs, 52 cubic inches. Cavity in uppor lobe of left lung. Emphysema very marked over the remaining portions of each lung. Cough very severe. Sputa abundant and yellow. Food cannot be retained owing to severity of cough. Patient unable to walk any distance. Feels worse than when he left Rhode Island. Throat very much inflamed, covered with thick mucus; bowels loose; tongue red, denuded of epithelium; urine is normal in quantity, reaction is acid; specific gravity, 1015; no sugar or albumen, heavy deposit of urates and uric acid; sleep disturbed very much by cough; appearance of patient bad.

Put on four to six inhalations twice a day of equal parts of oxygen and nitrous oxide (O and N_2O), and, as adjuvants, ex-

tract of malt and Wood's sedative cough mixture, with the following results:

May 6	(A. M.)—	Pulse	108,	Temp.	99 4-5°,	respirations	24.
" 6	(P. M.)—	"	132,	"	104°,	"	30.
" 13	(A. M.)—	"	120,	"	98½°	"	18.
" 13	(P. M.)—	"	120,	"	100 4-5°,	"	17.
" 20	(A. M.)—	"	116,	"	98½°,	"	18.
" 20	(P. M.)—	"	120,	"	102 4-5°,	"	18.

Examined lungs to-day. Could find no signs of improvement—the capacity remains the same, 52 cubic inches.

May 27	(A. M.)—	Pulse	120,	Temp.	98°,	respirations	18.
" 27	(P. M.)—	"	120,	"	101½°,	"	18.
June 2	(A. M.)—	"	104,	"	100 2-5°,	"	18.
" 2	(P. M.)—	"	116,	"	103°,	"	20.
" 4	(M.)—	"	124,	"	101°,	"	20.

An examination to-day reveals no improvement in condition of lungs. Though the respirations had diminished in frequency, yet the capacity of the lungs had not increased. From the end of first week began to increase the relative amount of O in the inhaler, and varied the number of inhalations as the case indicated. The appetite continued very poor. It became evident that the case was hopeless. Advised patient to go home, but before doing so to consult some other physician. Consulted a specialist; advised him to go to Kansas, a lower altitude. The father, who accompanied the patient, states that when Kansas was reached his son was so much worse that he decided not to remain. Patient lived a short time after reaahing home.

CASE III.

S. C. H., male, aged 33 years: native of Maine: shoemaker, sailor, artist; family history good. Four years ago an attack of acute pleurisy on left side, followed by pleuritic effusion, which was allowed to remain and afterwards was diagnosed as enlarged spleen by a physician in Lynn, Mass. After a time the effusion subsided and the lower part of left side "caved in." Some time after had hemorrhages, and decided to start for Colorado. Cough came on a month after coming to Denver. Left side seems to be dead.

Condition July 16th, 1886.—Inspection reveals a deep depression on lower part of left side. No motion of left side. Marked increase of motion of right side. Chest expansion 1½ inches, all made by right lung. Right lung normal, left lung consolidated, except upper part of upper lobe, where some air could be heard to enter. Cough harsh, sputa tenacious, bowels regular, appetite good, sleep fair, capacity of lungs 104 cubic inches.

Put on equal pprts of O and N2 O—five to ten gallons a day, with the intention of arousing activity of left lung and at same time healing it.

July 16—Pulse 80, Temp. 99 3-5°, Res. 18, capacity 104 cubic inches.

July 23—Pulse 72, Temp. 99 1-5°, Res. 18, capacity 156 cubic inches.

August 19—Pulse 72, Temp. 99 3-5°, Res. 18, capacity 167 cubic inches.

This evening the patient had a slight hemorrhage. Thought the blood came from upper part of left lung.

August 23—Pulse 78, Temp. 99 4-5°, Res. 16, capacity 180 cubic inches.

Sept. 23 (P. M.)—Pulse 96, Temp. 101°, Res. 17, capacity 200 cubic inches.

Sept. 28 (9 P. M.)—Pulse 84, Temp. 99 4-5°, Res. 16, capacity 200 cubic inches.

Oct. 10 (9 A. M.)—Pulse 96, Temp. 98½°, Res. 16, capacity 208 cubic inches.

Oct. 14—Patient had a severe hemorrhage, lasting an hour. For three days the sputa was heavily streaked with blood. Controlled hemorrhage by ergot at first, followed by use of ipecac and opium. Discontinued the use of O. Patient rallied from the effects of the hemorrhage and at last accounts was doing well. Left lung had gained an expansion of half an inch. During the course of treatment the patient often complained of pains through the left lung. It was my opinion that this soreness was caused by an awakened vitality in portions of the dormant lung—manifesting the results of exercise, as a muscle would that had long been quiescent. You will not fail to notice

that the capacity of the lungs had increased from 104 cubic inches to 208 cubic inches—a result that all the cod liver oil, malt, phosphites, hypo-phosphites, singly or combined, would be powerless to produce.

[LATER.—Patient consulted a specialist; advised him to go to Los Angeles. Died there in May.]

CASE IV.

J. H. S., male, aged 36½ years; native of British Guiana; in this country fourteen years; stenographer. Asthma from earliest recollections. Felt better since coming here, but still suffered.

July 20. On examination found a good pair of lungs, but there was considerable cough, tenacious mucus, sonorous rales. Capacity of lungs 104 cubic inches. Patient was under treatment two weeks. Capacity increased to 162 cubic inches. Considered himself benefitted. Used in this case N2 O three parts, O one part, eight to ten inhalations a day. The treatment never failed to stop a threatened attack.

CASE V.

P. D. G., male, aged 26 years; native of Illinois; in Michigan twenty years; one of seven children, three now alive; father died of consumption nineteen years ago; mother died of fever ten years ago; mother was healthy; engaged in the drug business for eight years; at present in the real estate business. Advised to come to Colorado by Dr. Campbell, of Ovid, Mich. Reached here in September, 1885. Spent almost a year in visiting different parts of the State. Improved very rapidly for a time.

Condition August 10, 1886.—Friction sounds over lower lobe of right lung, evidence of pleuritic adhesions. Expansion of chest, 1½ inches; capacity of lungs, 188 cubic inches; tongue coated in the centre, very red on edges and tip; pharynx congested and ulcerated; sleep, good; urine normal in quantity, reaction very acid; appetite very poor, bowels regular, efforts to get up the tenacious mucus in the morning cause emesis, pulse 132, temperature 102½°, respirations 22, slight cough, weight 117½ pounds.

Put patient on four to six inhalations of two parts of O and one part N2 O once a day, and as an adjuvant to this, beef peptonoids between meals.

August 14—Pulse 120, Temp. 100 3-5. respirations 17.

August 19—Pulse 96, Temp. 100°, respirations 17.

Patient was afflicted with a diarrhœa that confined him to his bed for a week.

Sept. 3—Pulse 96, Temp. 101°, respirations 17.

Sept. 19—Pulse 96, Temp. 99 4-5°, respirations 18.

An examination of the lungs to-day revealed one inch gain in expansion of chest, air entering lower lobe of right lung more freely.

Sept. 26—Pulse 96, Temp. 99 4-5°, respirations 18.

Oct. 26—Pulse 96, Temp. 99 3-5, respirations 16.

Patient, feeling very much improved, decided to discontinue treatment for a month. Lung capacity had increased from 188 to 234 cubic inches; expansion by measure around chest had increased over an inch. Appetite was good; there was a gain in weight—forgot to note how much; felt active and hopeful. The condition of the throat had yielded to treatment by O spray; there was no more emesis in the mornings. Recognizing the fact that the skin is simply an *everted lung*, and that there is a mutual dependence between the two, this patient had the good sense to follow the advice of taking a Turkish bath every Saturday. This portion of the treatment he still continues; there has been no need of returning to the inhalations. Yesterday (Dec. 18th), after coming out of the plunge, he was so buoyant that he kicked higher than the head of one of the full-grown attendants, but not calculating on the slippery floor, fell backwards, but was agile enough to escape without much injury. Said he felt splendid, and he looked it.

[June 10th, 1887—Patient in good health and engaged in active business.]

CASE VI.

E. K., male, aged 28 years; native of Newmarket, Ontario; school teacher; mother is healthy; father said to have died from attack of bronchitis when 26 years of age. First trouble

began in June, 1883. Did not teach for a year. At the end of this time engaged in teaching again. A year's teaching brought on another spell of sickness. Dr. Bently, of Newmarket, said the right lung was involved: that there was no breaking down of lung tissue: that there was no air entering posterior region of right lung. Strongly advised coming to this climate. Reached here June 15th, 1886,

Condition Sept. 14, 1886—(Examined by Dr. E. J. Rothwell.) Expansion, 2½ inches: left lung normal: expansion of left side 2 inches: right side, in upper part, ½ inch: no expansion in lower part of right lung. Complete consolidation of middle and lower lobe, with marked narrowing from before backwards. Vesicular murmur absent except in upper lobe. Appetite, fair: sleep, good: bowels, constipated: tongue, coated: urine, high colored, acid reaction: uric acid crystals abundant.

Put on six to eight inhalations a day of three parts O to one part each of air and N 2 O.

Sept. 14—Pulse, 96: Temp., 101½°: Resp., 22: capacity, 104 cubic inches.

Sept. 24—Pulse, 108; Temp., 100 1-5°; Resp., 16.

Oct. 1—Pulse 84, Temp. 99 1-5°, respirations 16.

Oct. 10—Pulse 104, Temp. 99 1-5°, respirations 17.

Oct. 13—Pulse 96, Temp. 99°, respirations 16, capacity 195 cubic inches.

In one month's treatment you will notice that the temperature fell from 101½ to 99, the respirations from 22 to 16, the pulse remained the same, the lung capacity increased 91 inches. Gentlemen, these are figures: figures do not lie: facts are stubborn things, but they are logical in their proper sequence. This patient, after one month's treatment, took charge of a school out on the Divide. A school-room may not be the best place for him, but the demands of a wife and family cannot be ignored. At last report he was doing well— intends sending for his family and remaining in Colorado. It is reasonable to think that the right lung may be restored to a state of activity at this altitude.

Jan. 1— Returned to city looking quite strong. Lung capacity increased to 208 cubic inches.

May 1—Returned to city. Capacity increased to 234 cubic inches. Doing well.

CASE VII.

Miss A. P., aged 21 years; native of Columbus, Ohio; resident of Cameron, Mo., for three years. Came to Colorado in May, remained a few months and returned to Missouri. Cough improved some while here, but returned again. Dr. Hamer, of Missouri, pronounced it the beginning of lung trouble, and urged a speedy return to Colorado. Family history of patient good.

Condition Oct. 7, 1886.—Diminished vesicular murmur over the lower lobes of both lungs. Expansion of chest, 1½ inches. Slight cough, sputa a dark yellow color, appetite poor, weight 123 pounds. Put on four to eight inhalations of O, three parts, N 2 O, two parts, air, one part, once a day.

Oct. 7 Pulse 96, Temp. 99 4-5°, respirations 24, capacity 104 cubic inches.

Oct. 14—Pulse 84, Temp. 99 3-5°, respirations 24.

Oct. 28—Pulse 84, Temp. 99 1-5°, respirations 20, capacity 162 cubic inches.

Nov. 8—Pulse 92, Temp. 98½°, respirations 18, capacity 162 cubic inches.

Air entering all lobes freely except lower lobe of right lung. Expansion of chest by measure, 2½ inches—a gain of an inch. Appetite is very much improved; sleeps well.

Nov. 23—Pulse 84, Temp. 99°, respirations 18, capacity 208 cubic inches.

Nov. 30—Pulse 80, Temp. 99°, respirations 18, capacity 208 cubic inches.

Dec. 9—Pulse 84, Temp. 99°, respirations 18, capacity 208 cubic inches.

Expansion of chest by measure 3½ inches—gain of two inches. Capacity of lungs doubled in two months. Appetite excellent; weight, 126 pounds; cheeks rosy; air entering all portions of the lungs freely. A catarrh from which the patient had suffered for some time yielded to a treatment of O spray. Patient returned to Missouri. [One month later—Married.]

CASE VIII.

W. F. B., male, aged 28 years; native of Illinois; in the grocery business; family history good. Taken sick two years ago in August; took a severe cold; first troubled with a dry cough; in a month began to expectorate freely. Took a great deal of medicine with no apparent benefit. Went to New Orleans and grew rapidly worse; then started for New Mexico. When he reached Albuquerque was scarcely able to walk. Went to bed and remained there for a week; began to improve rapidly. In a few months, under the advice of his physician, went as a herder down into Indian Territory. Roughed it and was wet for more than a month, night and day. Had a relapse and started for Denver, reaching here in a very weakened condition. Went to bed; soon began to improve. Went to work on a ranch near Golden. Was able to do his share of any kind of work. Unfortunately, was caught in a rain storm and surface of body chilled. Third relapse now set in and he came to Denver. Had an attack of pneumonia, through which he was attended by Dr. W. H. Davis. Recovery in this third relapse much slower than before. Recommended to us by Dr. Hawkins.

Condition on October 23— Inspection revealed deficiency of motion on right side. Percussion note high on the right side. Vesicular murmur absent from middle and lower lobes of right lung. Sonorous rales over whole lung. Expansion of chest by measure, 3 inches; expansion of left side, 2¼ inches; of right side, ¾ inch. Appetite, very poor; bowels, loose; tongue very red; urine, deficient in quantity (750 c. c. in 24 hours); reaction, strongly acid; specific gravity, 1024; no sugar or albumen; microscope showed oxalates of lime crystals. Weight, when well, 185 pounds; present weight is 140 pounds. Cough very severe, sputa abundant. Pulse, 95; Temp., 101 7-10°; Resp., 35; capacity, 78 cubic inches. Placed on inhalations of O, three parts, N2 O, one part, six to eight each day.

Oct. 28 (3 P. M.)—Pulse, 115; Temp., 102 1-5°; Res., 25; capacity, 100 cubic inches.

Nov. 1 (3 P. M.)—Pulse, 120; Temp., 105 2-5°; Res., 36.

Nov. 4 (7:30 P. M.)—Pulse, 108; Temp., 101 3-5°; Res., 28.

Patient suffers from a severe chill every day, which must be produced by the absorption of septic matter into the circulation. Experience has proved to me that quinine does not meet this indication.

Nov. 6 (2:30 P. M.)—Pulse, 96; Temp., 98°; Res., 24; capacity, 156 cubic inches.

Nov. 9 (2:30 P. M.)—Pulse, 120; Temp., 103½°; Res., 24.

Nov. 10 (2:30 P. M.)—Pulse, 90; Temp., 100 4-5°; Res., 24.

Nov. 13 (2:30 P. M.)—Pulse, 120; Temp., 104 4-5°; Res., 40; capacity, 78 cubic inches.

Nov. 16 (8 P. M.)—Pulse, 108; Temp., 101 3-5°; Res., 36.

Nov. 21 (10 A. M.)—Pulse, 84; Temp., 98½°; Res., 18; capacity, 156 cubic inches.

Patient related that a large quantity of matter escaped through the mouth early in the morning, and soon after he felt much improved. Probably an abscess broke and emptied itself.

Nov. 23. Patient, feeling quite well, defers treatment. Appetite is very good.

During all this month the patient attended to his work in the store—delivered goods with a temperature of over 105 3-5°. There was no use of telling him to rest, he was too busy. Do not think there was very much gain in this case, except in capacity.

CASE IX.

F. D., male, aged 28 years; native of Ohio; school teacher; sent to us by Dr. Exline, of Colorado Springs. Father died of chronic diarrhœa in the late war, at age of 35; mother alive and well; brother died of consumption; one sister alive and in good health. No history of consumption in the family on either side for generations.

Condition Sept. 8, 1886—Expansion of lungs by measure, 2½ inches; capacity, 156 cubic inches. Find partial consolidation in lower lobes of both lungs; rales in the left bronchial region. Appetite poor, sleep unrefreshing, tongue coated and deeply furrowed, heart irritable, bowels regular, night sweats.

Placed on six inhalations twice a day of equal parts of O, N_2O and air. Advised to quit chewing tobacco.

Sept. 8 (P. M.)—Pulse, 108; Temp., 101 1-2°; Resp., 16; capacity, 156 cubic inches.

Sept. 20 (A. M.)—Pulse, 96; Temp., 98 1-2°; Resp., 13.

Sept. 20 (P. M.)—Pulse, 100; Temp., 101 1-5°; Resp., 16.

Sept. 27 (A. M.)—Pulse, 108; Temp., 98 1-2°; Resp., 16.

Sept. 27 (P. M.)—Pulse, 80; Temp., 99 3-5; Resp., 16.

Patient complained of passing large quantities of water. Noticed that there was great thirst; suspected diabetes. Ordered a twenty-four hours' specimen of urine. Quantity, 2050 c. c.; reaction acid; specific gravity, 1010; odor sour; color a dirty yellow; no trace of sugar or albumen; phosphates abundant.

Oct. 8 (P. M.)—Pulse, 100; Temp., 100 4-5°; Resp., 16; capacity, 234 cubic inches.

Examination of lungs shows expansion increased to three inches, no rales in left bronchial region, air entering lower lobes of each lung more freely. Patient could not be induced to quit chewing tobacco.

Oct. 16 (A. M.)—Pulse, 90; Temp., 98; Resp., 16; capacity, 234 cubic inches.

Oct. 18 (P. M.)—Pulse, 96; Temp., 102°; Resp., 16; capacity, 234 cubic inches.

Oct. 19 (P. M.)—Pulse, 96; Temp., 103°; Resp., 16.

The patient had been using as high as ten gallons twice a day—a fact that escaped my notice. He complained of soreness all over the left side. Ordered the inhalations discontinued for a week.

Oct. 28 (P. M.)—Pulse, 96; Temp., 100 3-5°; Resp., 16; capacity, 234 cubic inches.

Nov. 8 (P. M.)—Pulse, 96; Temp., 99 1-2°; Resp., 16; capacity, 234 cubic inches.

Examination at end of second month's treatment shows the following: Expansion of chest, 4 inches; capacity 234 cubic inches, a gain of 78 cubic inches; temperature lessened 2°; respirations unchanged, pulse the same (owing to the excessive use of tobacco), sleeps soundly, appetite not much improved, urine diminished to normal quantity, cough very much improved, sputa decreased.

This patient called at the office every second or third day

for six weeks after discontinuing the treatment. Suffered a good deal from indigestion. Prescribed three meals a day, with lunches between, but he was not so situated as to carry out the suggestion. It was a case in which the Turkish bath would have proved beneficial, but he imagined it would be too weakening. He was dissatisfied with his lot in life, and was advocating the Spartan rule that only the strong and healthy children should be allowed to live. He had gaged the time of his getting well by the amount of money he had to spend ($400) when he left home--when that was spent he expected to be well. He became restive and discontented as his money neared a finish, and fretted, asked dozens of questions, theorized, and chewed tobacco. This is a case in which employment would have been useful.

CASE X.

Mrs. F. I., aged 45 years; native of Missouri; a very fleshy woman. Had frequent hemorrhages for six years. Pulse and temperature normal. Never was able to make a diagnosis of the case that was satisfactory. Confined to bed for months of January, February and March almost constantly (1886). During this period the sputa was always stained with blood. Tried various remedies without any success. Concluded the patient's case was almost hopeless. As a last resort put patient on inhalations of O and N_2O, proportion 3 to 1. In one month she discontinued the treatment and went to work. She has remained free from the hemorrhages since. The relief in this case surprised me. Cannot fully understand the hemorrhages, whether they may not have been vicarious, and yet there was nothing to support such a theory, that I could find.

CASE XI.

Miss N. A., aged 28 years; native of Ohio; father and mother healthy. Lung trouble followed a severe attack of measles. Under care of physicians for ten years, some of the best being consulted. Treated by a physician for uterine trouble. Would be benefitted for a short time and then relapse into former condition. Had severe occipital headache from her earliest recollection; this was never benefitted. Advised to come to Colorado—reached here in June and resided in Evans. There was

no improvement. Dr. Swan, the family physician, of Ohio, advised coming to Denver and taking a course of treatment at our office.

Condition Sept. 2.—Lower lobe of right lung and posterior part of upper lobe consolidated, cough troublesome, ropy mucus expectorated in the mornings, persistent headache, no appetite, food causing distress. Pulse, 115; Temp.. 101 1-2°; Resp., 29; lung capacity, 52 cubic inches. Put on four inhalations a day of equal parts of O, N_2O and air.

Oct. 2—No marked improvement. The headache so severe that the thought of some deficiency in the accommodating powers of the eyes might be the cause. Eyes were examined and glasses fitted by Dr. John Chase.

Nov. 2—Improvement quite evident. Periods without any headache. This improvement not owing to the glasses, for she could not use them. Stubborn condition of constipation, from which patient had suffered for years, commenced to yield.

Nov. 16—Lung trouble completely removed. Capacity, 104 cubic inches. Dyspeptic condition still persistent. Put on three inhalations a day of O alone.

Dec. 13—Patient eats well, sleeps well, bowels regular, in a fair way of making a complete recovery.

June 1—Patient continues well to date.

CASE XII.

Miss M. A., aged 21; a sister of the last mentioned. Has had cough for three years, following an attack of pneumonia. Yielded to treatment in two months. Cases XI and XII had severe catarrhal troubles. Both cases cured by the oxygen spray.

CASE XIII.

Mrs. W., aged 32 years; native of Texas; family history good. Present condition attributed to pleurisy. Has been treated by homœopaths, eclectics, electricians, hydropaths, faith cures, and has taken medicine that was advertised in the *Christian Advocate* to cure consumption.

Condition Dec. 23, 1886—Left lung unable to perform any work, large cavity in middle of upper lobe, no air entering lower lobe. Upper part of left lung invaded. Pulse 130, Temp. 103°, Res. 30, capacity 36 cubic inches (noon). Bowels regular, tongue red on tip and edges, not able to sleep on account of

constant pain in right hip joint, right leg flexed on thigh at angle of 135°, suffering severely from sciatica, confined to bed for last six months, severe pain across the back. Urine—Reaction strongly acid, specific gravity 1019, quantity 350 c. c., no trace of albumen or sugar, crystals of uric acid very abundant.

Told the husband that there could be nothing done for this case. He asked me to come and do the best I could. Agreed to do so, but knew and told him the case was hopeless. Placed on four inhalations four times a day of three parts O to one part N_2O (taken to patient in a rubber bag), and an alkaline diuretic to be taken half way between meals. For a few nights the sleeping was very much improved. In one week patient was able to get up and sit in an easy chair for three or four hours. Saw the husband was becoming hopeful. Patient was cheerful and able to talk freely. Called the husband to one side and told him that if he thought I had hopes of curing his wife that my visits would cease there, as making visits was but a small part of a physician's duty.

The quantity of urine had doubled, the amount of uric acid diminished. Severe pain in sciatic nerve relieved for a time by injections of chloroform upon the nerve. End of second week's treatment found very little improvement. End of third week patient talked of going home. Ate a hard-boiled egg January 4th. Caused indigestion—severe pains through the bowels. Relieved by external applications. Morning of January 5th taken with pain in lower lobe of right lung—pleuritic in character. The pain was very acute, breathing labored. There would be no difficulty in relieving this pain, but is the use of opium rational? Would not use opium in any form, and told husband my reasons. Gave hypodermic of strychnia to stimulate the breathing centre, painted over seat of pain with tincture of iodine and applied poultice. The pain was not much improved. Another physician was called in consultation: was not able to be present, but wrote consultant my reasons for not giving opium in any form. Consultant advised ¼ gr. pills of codeia every hour till pain was relieved. Patient resting easy evening of the 5th. Was forced to maintain that the effect was disguised by the codeia, but the cause was not removed, that

the general system was injured, that the opium would deaden the desire to breathe, and that the patient would feel like giving up the struggle for life. This happened morning of January 6, at 2 A. M. You may decide for yourselves whether to stimulate the breathing centre or to obtund it was proper. To what extent we can employ euthanasia in these cases is debatable. Nature takes the edge off the pain by the stupefying effects of the carbon dioxide retained in the blood. Let her attend to this.

This patient was in comfortable circumstances, and during my visits the thought occurred to me to make an inventory of what was on the shelf: Large bottle "Pure Norwegian Cod Liver Oil," with perhaps one dose taken out; bottle Scott's Emulsion, half taken; bottle "Phillips' Emulsion," half taken; hydroleine, steam atomizer and inhalants to use, small hand atomizer for the throat, whisky, aconite, digitalis, ammonia, effervescing draughts, Alaska grape, quinine pills, pepsine tablets, sherry wine, claret wine, sweet oil, etc., etc.—wrecks remaining after a feeble though costly campaign—defeat written on every one. These are hard things to look at. A scientific physician must look at them—not dodge them, turn to one side and run away from the fearful responsibility placed upon him and mournfully say: "All was done that could be done." In the beginning of this woman's trouble nothing was done as it should be, and her life was sacrificed by unscientific drugging.

CASE XIV.

H. F., male, native of Missouri, aged 35 years; mother well; father dead, but does not know the cause; brothers and sisters have lung trouble. Began to feel badly five months ago. Severe cough, abundant sputa (purulent in character), lost in weight rapidly. Tongue very red on edges and tip, furred in centre, appetite poor, coughs up food, bowels loose, urine high colored and scanty, sleep rendered unbearable by night sweats. Has had night sweats for six months. Lungs—Respiratoy murmur indistinct, both apices softened, small cavity in upper lobe of left lung. Appetite very poor, urine scant and very acid.

Dec. 20 (A. M.)—Pulse 108. Temp. 102½°, Res. 30, capacity 52 cubic inches.

Dec. 24 (A. M.)—Pulse 100, Temp. 98 4-5°, Res, 23, capacity 76 cubic inches.

Dec. 28 (A. M.)—Pulse 101, Temp. 98 4-5°, Res. 23, capacity 76 cubic inches.

Night sweats entirely cease; sleep refreshing.

Jan. 4. (EV'G)—Pulse, 92; Temp., 99°; Resp., 28; Cap., 78 c. i.
" 8. " " 95: " 98°; " 23: " ——
" 16. " " 90: " 101°; " 27; " 91 "
" 25. " — " 82; " 98⅘°: " 20; " 91 "
Feb. 20. " — " 80; " 98½°: " 19; " 104 "

Patient discontinued treatment. Many of the symptoms had markedly improved. The cough still remained dry and harsh.

CASE XV.

Mrs. F. W. L., aged 24, native of New York; no history of lung trouble in the family; complains of a burning pain in the left mammary region; has had this for two years. Physical examination of lungs reveals no disease, but there is evidence of the evil effects of *tight lacing:* there is no capacity, and as a consequence the *rhythm* of the life processes is wanting.

Dec. 1. (A. M.)—Pulse, 96: Temp., 98½°: Respirations, 32; Capacity 52 c. i.

Jan. 4. (A. M.)—Pulse, 84: Temp., 98½°: Respirations, 28; Capacity 130 c. i.

Jan. 11. (A.M.)—Pulse, 72: Temp., 98½°: Respirations, 24; Capacity 130 c. i.

Patient's appetite very much improved. No more pain in the chest. Advised to discontinue treatment and to exercise the lungs at home in such a manner as to develope them—forced inspirations, forced expirations, &c., &c.

CASE XVI.

A. E. B., age 22; native of Canada; father healthy; mother healthy when he was born and before; but died of lung trouble, result of cold. Had pneumonia, made a partial recovery and went to work. In January became so weak that work was impossible. Had intermittent fever; failed rapidly. Unable to eat: distressing pain in the stomach.

Present condition: Lungs: respiratory murmur diminished very much; breathing bronchial, expansion, limited one-half; no breaking down of lung tissue. Patient very anaemic, though six feet high, weighs about 108 pounds. Rheumatic pains: night sweats; irritable. Urine very acid.

Placed on four inhalations a day of O three parts, N2 O one part.

April	9,	(A.M.)	Pulse,	96;	Temp.	99½°;	Res.	20;	Cap.	104	c.i.
"	14,	"	"	92;	"	99°;	"	20;	"	130	"
"	21,	"	"	90;	"	99°;	"	20;	"	140	"
May	2,	"	"	96;	"	99⅘°;	"	18;	"	156	"
"	8,	"	"	100;	"	99⅖°;	"	20;	"	130	"
"	21,	"	"	112;	"	100½°;	"	18;	"	156	"
"	23,	"	"	96;	"	99⅕°;	"	18;	"	164	"
"	28,	"	"	80;	"	99⅕°;	"	20;	"	156	"
June	10,	"	"	72;	"	98½°;	"	18;	"	182	"

Patient improved remarkably. Has gained 20 pounds in weight. Appetite is very good and sleep refreshing. The color is returntng to his checks. His improvement surprises every one.

CASE XVII.

Mrs. P., aged 39: native of New York; family history good. Over one year of life spent in constant attendance on an adopted brother that died of consumption. Shortly after this event, began to have cough and tired out feeling. Came to Colorado four years ago. The cough improved, but the feeling of weariness continued. At the present time am troubled with severe headaches, constipation, sleeplessness, nervous irritability, cough in the morning. Examination of the lungs:—The chest is well formed. Nothing abnormal found except an area of dullness under right shoulder blade.

Owing to prominence of nervous symptoms placed patient on four inhalations a day of equal parts of O and N2 O.

May 3, (A. M.): Pulse, 84; Temp., 99 2-5°: Res., 20: Capacity, 78 c. i.

May 6, (A. M.): Pulse, 84; Temp., 99 1-5°: Res., 20: Capacity, 104 c. i.

May 16, (A. M.):—Pulse, 92; Temp., 99 1-2°; Res., 20; Capacity, 104 c. i.

May 20, (A. M.):—Pulse, 92; Temp., 98 1-2°; Res., 18; Capacity, 117 c. i.

June 10, (A. M.):—Pulse, 84; Temp., 98 1-2°; Res., 18: Capacity, 130 c. i.

Patient's appetite very much improved. Is able to sleep all night and sometimes takes a nap in the day. Walks with a buoyant step. Region of dullness is clearing up. Will make a complete recovery.

CASE XVIII.

Miss M. B., aged 23: native of Iowa: family history good. Has had three attacks of pneumonia: in Colorado since January. Gained rapidly after coming here for a couple of months and then began to fail. At the present complains of great prostration, is very anaemic. Severe neuralgic pains over the whole body, sleep is not refreshing. Appetite very poor. Patient very low spirited. Lungs show expansion by measure to be only ½ inch. Area of dullness extends over lower lobes of both lungs. A case of phthisis following pneumonia.

Placed on four inhalations a day of O three parts N_2O one part.

April 30th (P. M.)—Pulse, 120; Temp., 101°; Resp., 30; Capacity 26 c. i.

May 20. (P. M.)—Pulse, 92: Temp., 99°: Respiration 28: Capacity 52 c. i.

May 23. (P. M.) Pulse, 72: Temp., 98½°: Respiration 20; Capacity 104 c. i.

Said to-day that she feels so well that her improvement seems like a miracle. Face looks cheerful.

May 25. (P. M.) Pulse, 72: Temp., 98½°: Respiration 20; Capacity 130; c. i.

June 10. (P. M.)—Pulse, 76: Temp., 98° ½ Respirations 20; capacity, 130.

Patient has been at work for a week and is feeling very well. Cheeks now have a good color.

CASE XIX.

Mr A., native of England: age 24 years. Came to Colorado on account of some bronchial affections. Was very much improved by the climate, but was still suffering when he came under our care. Placed on four inhalations a day of equal parts of O, N_2O and air. Capacity at first 104 cubic inches. Has been under treatment a month and a half. Capacity of lungs at

present 234 cubic inches. The bronchial secretion has disappeared and he feels like a new man. A complete recovery in this case.

CASE XX.

C. T., aged 13: native of Michigan, family history good, occupation, working in a soda bottling factory: position sedentary, exposed to a great deal of wet, brought on severe cold with cough and general debility: marked narrowing of lung capacity: not able to take more than 52 cubic inches. Severe night sweats. Put on four inhalations a day of equal parts of O, N_2O and air. Continued treatment for five weeks: at the end of this time the cough was gone, there was a gain of 13 pounds in weight, the appetite was good, no night sweats, capacity increased to 156 cubic inches. There was not a drop of medicine taken.

APPLICATION OF OXYGEN TO DISEASE OF THROAT AND NOSE.

This department is conducted by Dr. E. J. Rothwell. Over a dozen cases of post nasal catarrh, tonsilitis, pharyngitis, larnygitis etc, have been treated without a single failure. The medicament is a strongly saturated oxygen spray. If oxygen is applicable to diseases of the lungs (the lower air passages) there is no reason why it should not be applicable to diseases of the nose and throat (the upper air passages.)

There are some members of the profession that condemn the use of the spray, and, doubtless, in many cases of catarrhal troubles, it is useless of itself. But, as a rule, an examination of such cases will reveal the fact that a little surgical interference to correct a crooked septum or remove a polypus is necessary to go before the spray treatment. The apparatus needed for the exhibition of this method of treatment is neither cumbersome nor expensive.

Air compressor, spray producer and instructions for preparing different sprays, $50.00.

Oxygen's Place in Surgery.

A few pages back I referred to the effects of a stream of O poured upon an unhealthy sore. But there is another use well worthy of attention. I contend that from eight to ten long in-

halations of O, taken before the administration of an anæsthetic, make an accidental death from the effects of such agent, almost, if not quite, impossible in operations that last from five to ten minutes, and do proportionate good in longer operations.

The reason has been pointed out before. After taking eight or ten inhalations of O the breath can be held for from three to five minutes; after that, for as many more minutes, the breathing is very shallow. The blood being so thoroughly oxygenated, the danger of paralysis of the breathing center by the action of the anæsthetic is reduced to a minimum for the time pointed out. We have used O for over a year in all the surgical work in our office with the most happy effect. Patients pass under effects quickly, come to quickly, and suffer none from shock, and there is very little vomiting.

Other Uses of Oxygen.

In addition to the uses of O referred to in the title of this treatise, we found it beneficial in other conditions as a few cases will show.:

D. R., male, aged 37 years: native of Ontario; school teacher. Family history, good. Lungs sound as a bell, capacity, 234 cubic inches. Troubled with insomnia. Had not slept a sound, refreshing sleep for six months. Placed on treatment three times a day. At end of three months began to sleep better, and at the present time is free from the trouble. The exercise of the lungs has developed them to a capacity of 286 cubic inches.

A. F. M., male, aged 60 years: suffering from dyspepsia. So reduced in strength as to be gloomy and despondent. Haunted with the dread that he was going to kill his nephew, whom he loved most tenderly. So real did this fancy become that he had the nephew removed from his presence. He wept bitterly over the fact that he could entertain such thoughts. Could not sleep. His appetite was good, but the food was not assimilated. Pepsin would not do the work. Reasoned that the brain was anæmic. Put on O three parts and air one part, eight gallons a day. Improvement at end of first week very marked. Began to sleep soundly. At end of second week his

peculiar fancies had disappeared. At the end of month's treatment countenance was cheerful, gloomy thoughts banished, food properly assimilated, able to tell a good story and enjoy it.

Miss N. A., painful mensturation. Has suffered extremely at each monthly period for ten years. Four to six inhalations a day for a few days before and during the continuance of period had a most gratifying effect.

Miss D. E., suffers from severe headache during monthly periods. The discharge is very scanty and of a very dark color. The inhalations of oxygen during the period benefitted every symptom; the color was very much improved.

Mrs. P., digestive apparatus very much out of order during monthly period; slight pains, feeling of utter wretchedness. During treatment, appetite excellent at these times and feelings cheerful and bouyant.

Note This.

Weight of chemical elements in the body of a man weighing 148 pounds (from Prof. W. O. Atwater, in May *Century*:)

Oxygen	92.4 pounds.
Carbon	31.3 "
Hydrogen	14.6 "
Nitrogen	4.6 "
Calcium	2.8 "
Phosphorus	1.4 "
Potassium	.34 "
Sulphur	.24 "
Chlorine	.12 "
Sodium	.12 "
Magnesium	.04 "
Iron	.02 "
Fluorine	.02 "
Total	148.00 pounds.

Conclusion.

From the cases reported, and arguments before stated, there should be no doubt of the value of O as a therapeutic agent. There should be no doubt that consumption is a *local*

disease, producing constitutional effects, and that the cause of the disease should receive *local* treatment.

We have sent for an apparatus and intend to carefully test Dr. Bergeon's method of treatment by gaseous enemata. This plan depends upon the fact that the H_2S is a germicide, and that, although absorbed by the *bowel*, yet it is given out by the *lungs*, and hence is a *local* treatment. Certain persons with lung troubles are benefitted by using alcohol. To my mind this, too, is a *local* treatment, for the reason that the alcohol, though it enters the blood through the *stomach*, yet it is given out by the *lungs*, and alcohol is a germicide.

We intend to embrace in our system of lung therapy, also, the method known as "pneumatic differentiation." This would give us the power to so alter the environment of the patient that in the confines of the office he could have an atmosphere as dense as at the level of the sea, ten thousand feet below the level of the sea or as rare as ten thousand feet above the level of the sea.

If this little volume will do something towards the advancement of the proper methods of lung therapy and result in benefitting unfortunate sufferers, my labor will not have been in vain.

P. D. Rothwell.

SUGGESTIONS TO PATIENTS UNDER TREAMENT.

I. Avoid violent exercise of any kind; you can exercise the lungs without putting the whole body in motion.

II. During each treatment, first breathe out all the air you can possibly force from the lungs, then breathe in from the inhaler till every available portion of the lung is called into use.

III. Nothing that would interfere with the free expansion of the chest should be worn.

IV. Sleep in large, well ventilated rooms.

V. Breathe through the nostrils.

VI. Remain out of doors in the sunshine as much possible.

VII. Avoid the use of tobacco in any form.

VIII. Keep out of draughts.

IX. Keep away from third-rate hotels and restaurants.

X. Eat three principal meals each day, and, if possible, have light lunches between meals.

XI. Cough only when necessary, then do not cough till the lungs are filled with air—it will do some work and not produce as much distress as when you cough with your lungs almost empty.

XII. Wear woolen underclothing, woolen hose, thick-soled boots.

XIII. By massage and bathing keep the skin in good condition. Your lungs cannot improve if the skin is inactive.

XIV. Do not expect any miracles: it took time for your bodily health to become impaired: it will take time for it to be restored.

XV. Make a business matter of your treatments: be punctual; be exact in following out every matter of detail.

XVI. A common source of dyspepsia is swallowing of expectoration. Do not do this.

XVII. The sputa should be ejected into vessels in which it can be disinfected.

XVIII. Drink freely of water; hot water preferred; ice water should not be used.

Oxygen Apparatus.

Physicians can be furnished with the following by us: Two 60-gallon galvanized gasometers, improved oxygen retort and connections, one quart glass retort for generating N_2O, eight improved wash bottles (gallon capacity), ten inhaling bottles, twenty feet ½-inch rubber tubing, one dozen mouth-pieces, one gas or kerosene stove; pulleys, cords and weights for suspending meter; five pounds of each kind of prepared material for generating O and N_2O, rubber gas bag (ten gallons), five copies of "Oxygen as a Therapeutic Agent," by P. D. Rothwell, M. D.

Net price, packed for shipment.....$150.00
Nickel-plated dispensing gasometer..... 50.00

We will guarantee our oxygen retort to last fifty years. Copper retorts wear out in a couple of months and are a constant source of expense. The wash bottles in our apparatus

will last indefinitely, as they are not made out of glass. In many features our apparatus excels any now in use. The gas generated is of superior quality, and the freedom from breakage of apparatus is a most important feature. No glass tubing is required for the wash bottles. Physicians intending to introduce oxygen in their practice will do well to consult with us. We can furnish any size of apparatus that may be required.

ITEMIZED PRICE LIST.

Gas or kerosene stove	$5.00 to $10.00
One-half gallon improved oxygen retort and connections	10.00
One quart N_2O retort (glass)	2.00
One-gallon improved wash bottle (not liable to break)	1.50
Rubber corks, per doz	3.00
Glass mouth-pieces, per doz	1.50
Best ½-inch white rubber tubing, per foot	25
Best cloth-inserted rubber tubing, per foot	35
Eight-gallon rubber gas bag, with mouth-piece	10.00
Prepared material for making O from best chemicals, per pound	50
Prepared material for making N_2O from best of chemicals, per pound	50
Inhalers, with rubber cork and tubes	2.00

Remittances may be made by money order. A reasonable advance must accompany all C. O. D. orders. Address

DRS. ROTHWELL,
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Milk, plentifully,
Koumiss,
Cream and Seltzer,
Egg Nogg,
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Mutton Broth,
Oyster Soup,
Clam Soup,
Beef, raw or rare, Turtle Soup.
[Remove coarse fibre] [No fibre]
Mutton, baked or boiled,
Poultry, stewed, steamed, boiled.
Haddock, Cod,
Whiting, Trout,
Eggs beaten, raw,
Spinach, Eggs, soft boiled.
Asparagus,
Tomatoes,
Cauliflower,
Bacon fat, Beans and Peas,
Mutton fat, Butter, Wheat Bread.
Cream,
Soluble Food, Salad Oil.
Beef Peptonoids,
Milk Preparations

Food for patients under 30, largely of hydrocarbons; those over 40, albuminous.—*Loomis.*

TO AVOID.—Sugars and starchy vegetables except in special cases.